

Feb. 9, 1926.

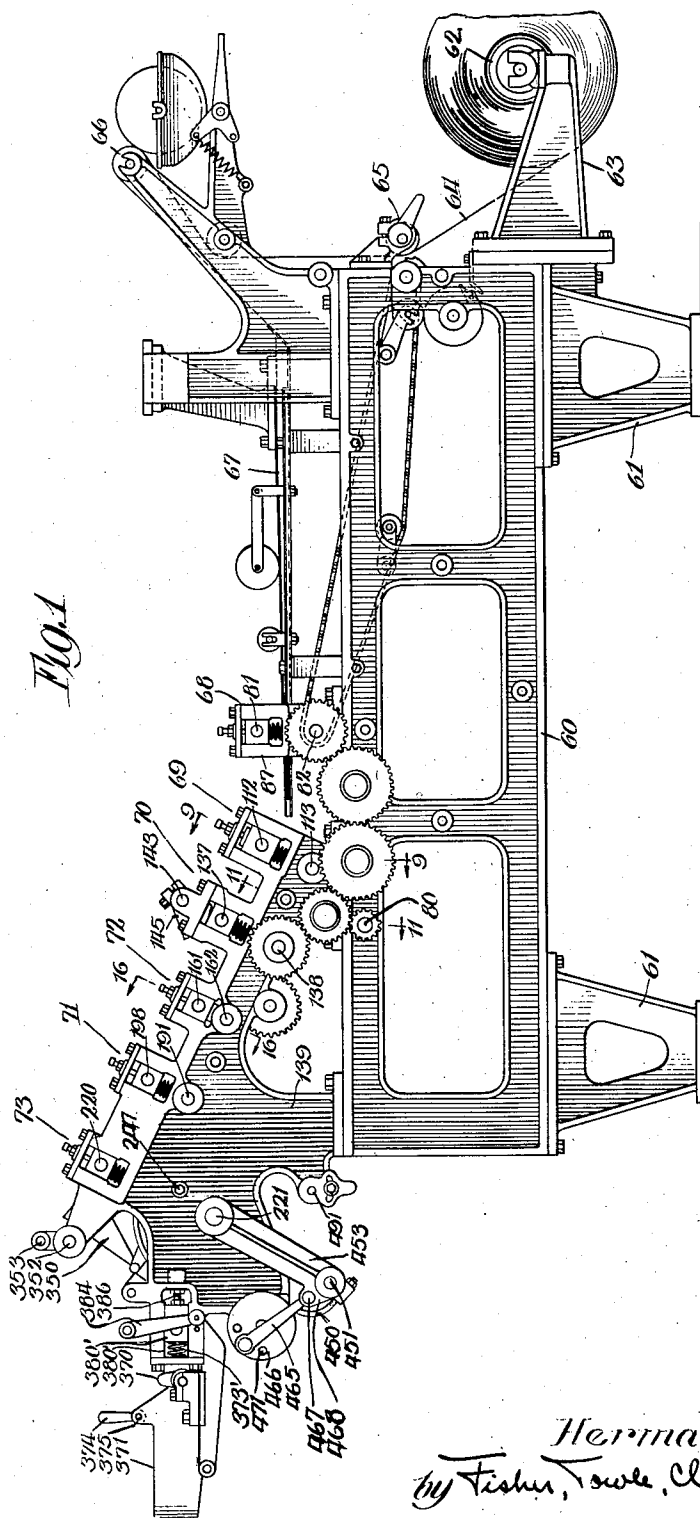
1,571,983

H. G. WEBER

PAPER BAG MACHINE

Filed Oct. 24, 1923

16 Sheets-Sheet 1



Inventor:
Herman G. Weber
by Fisher, Towle, Clapp & Loane
Attys

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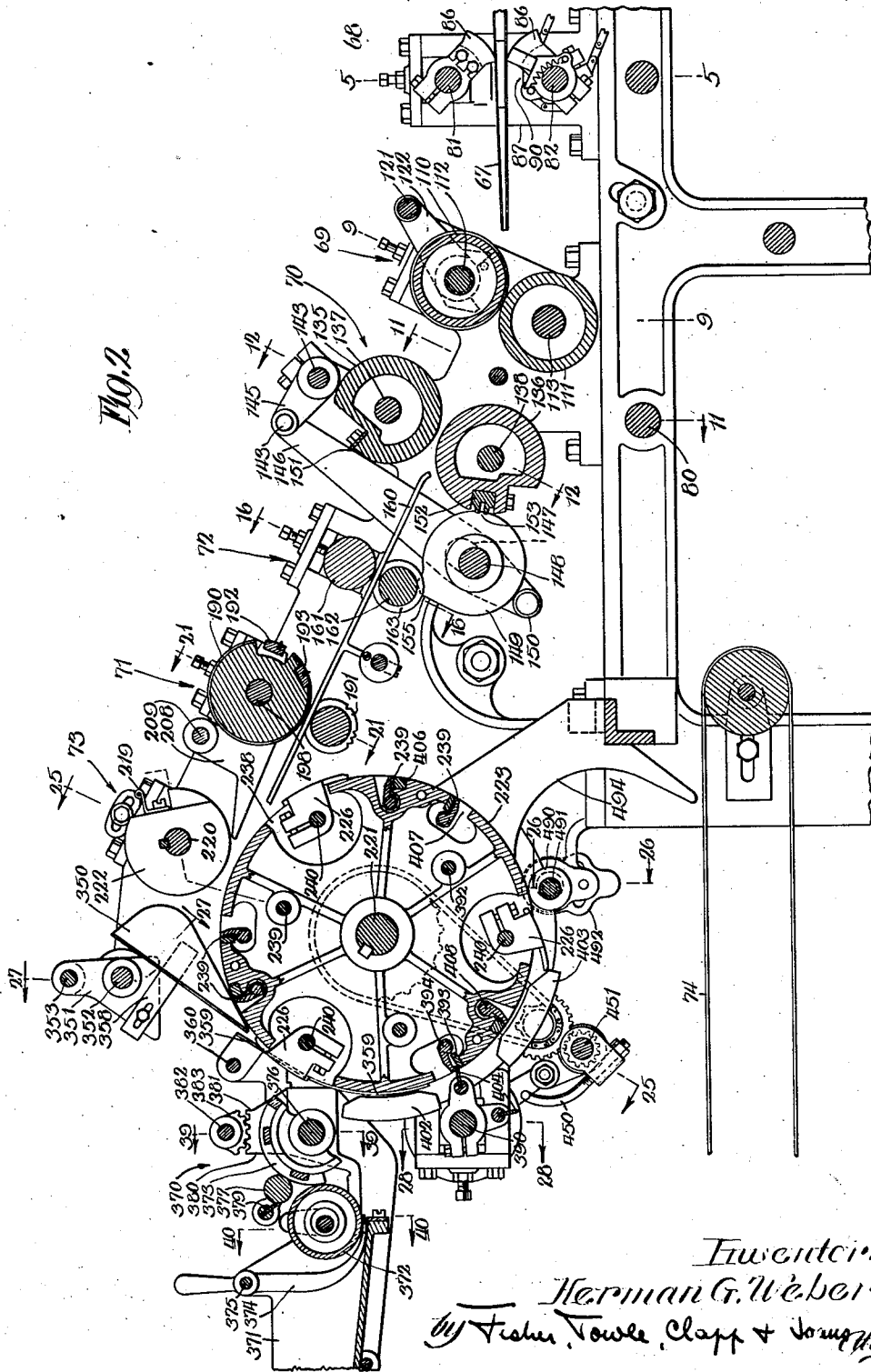
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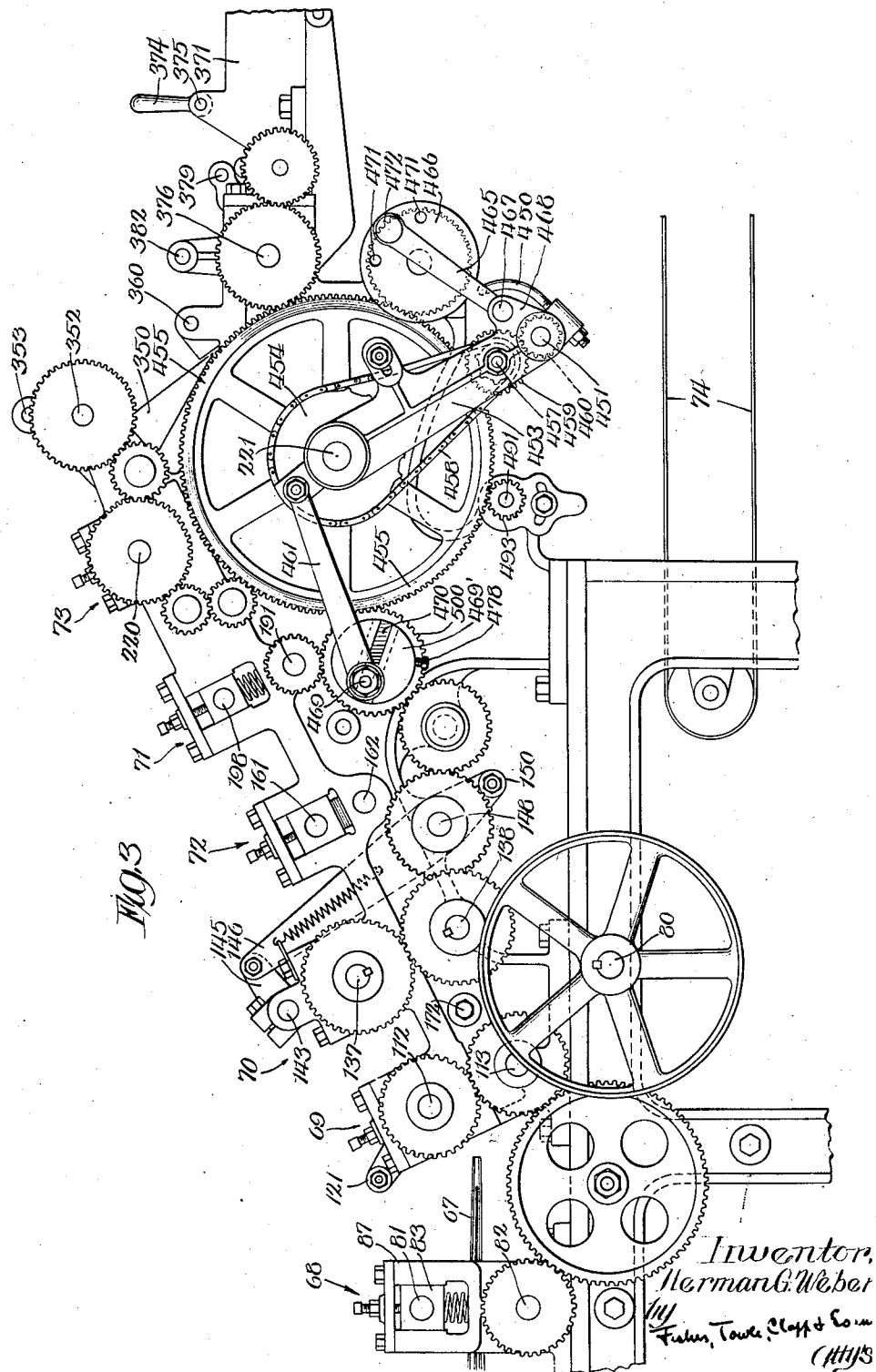
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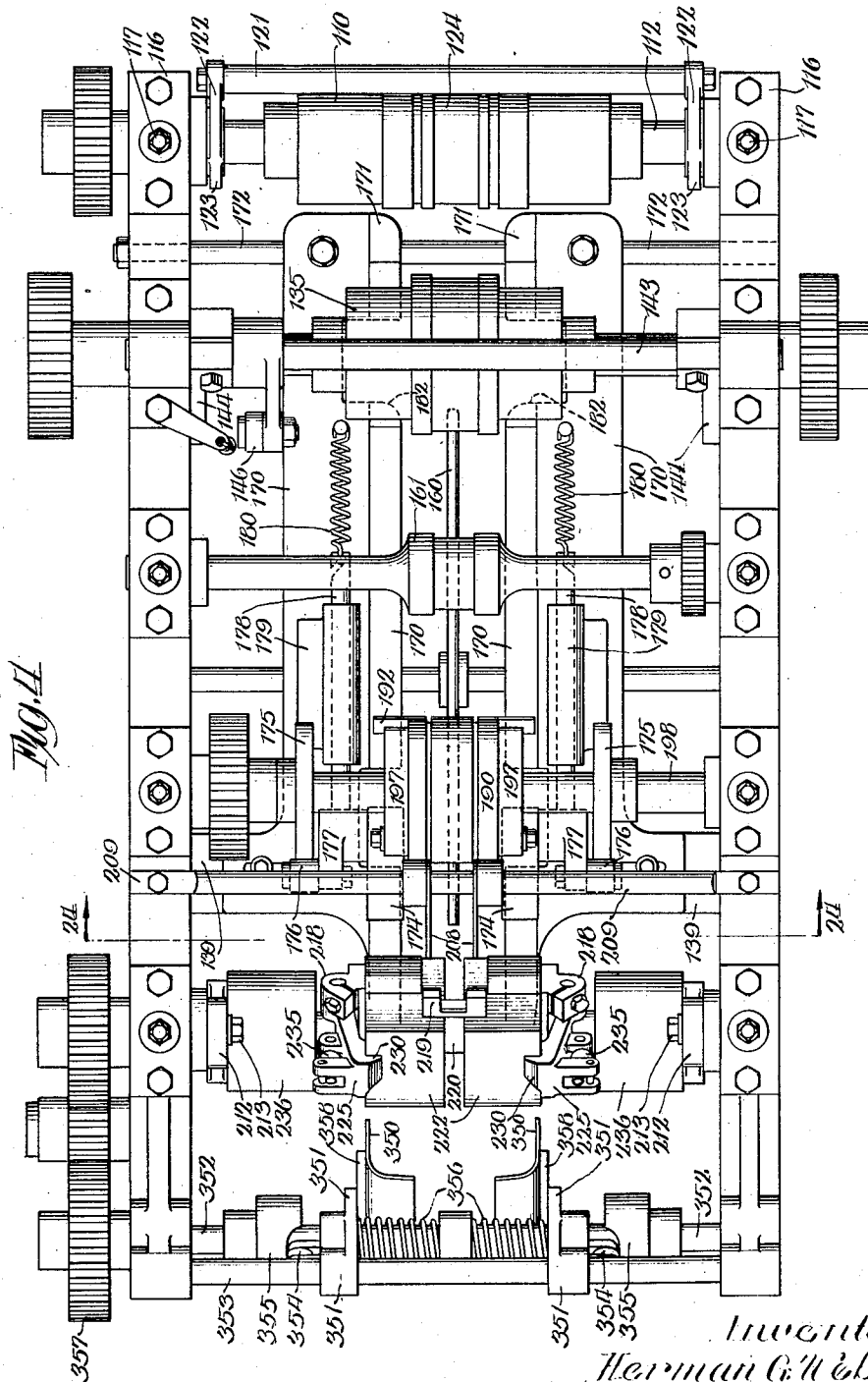
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H. G. WEBER

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16 Sheets-Sheet 4



³⁵₃₅ Inventor:
Herman G. Ueber.

(111) Fisher, Towle, Clapp + sons (111) S.

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1,571,983

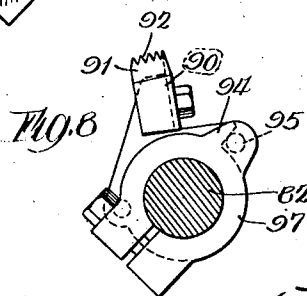
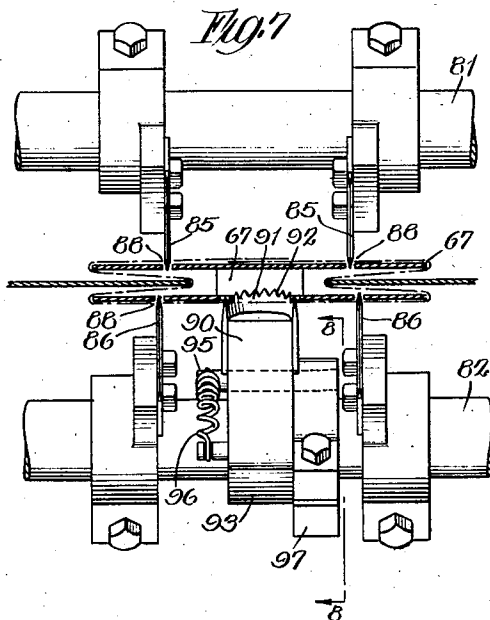
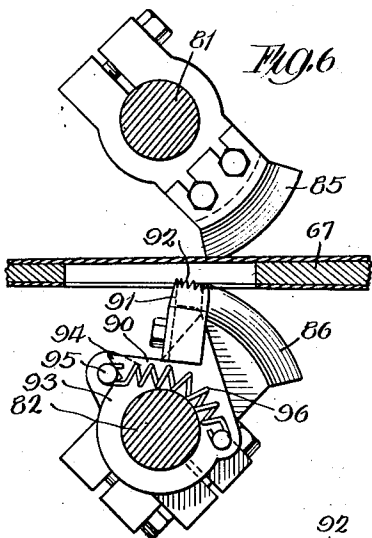
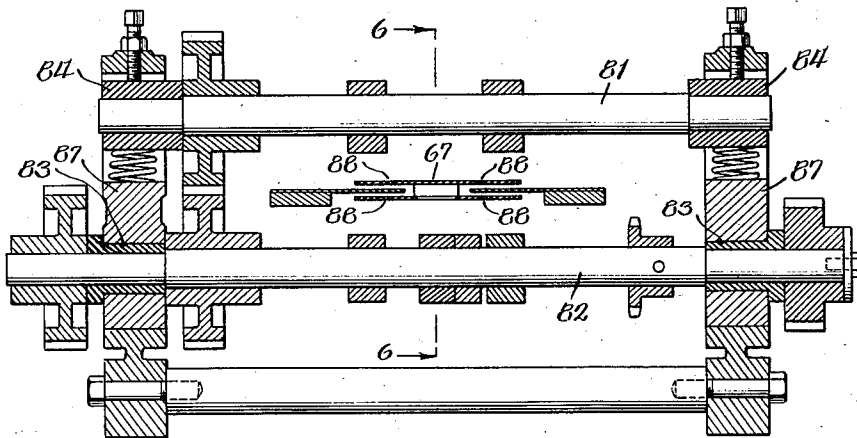
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Fig. 5



Inventor:
Herman G. Weber
By Fisher, Towle, Clapp & Soars
Attys.

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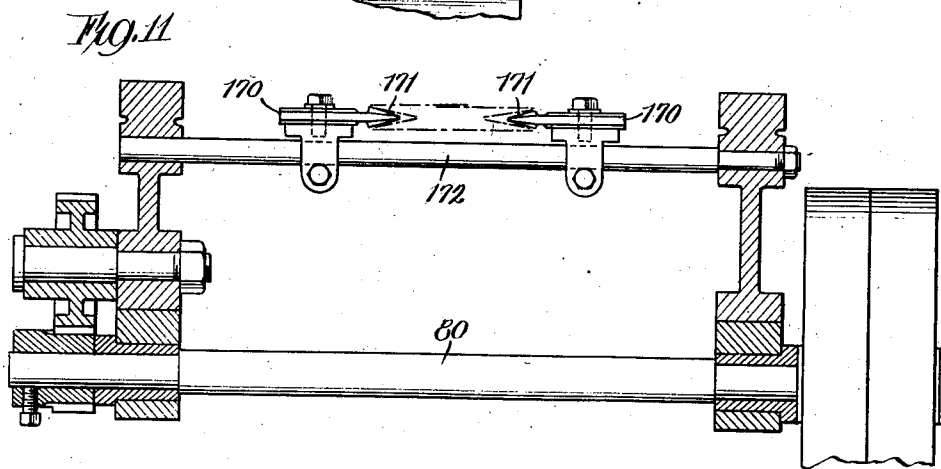
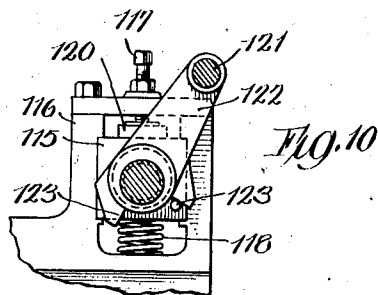
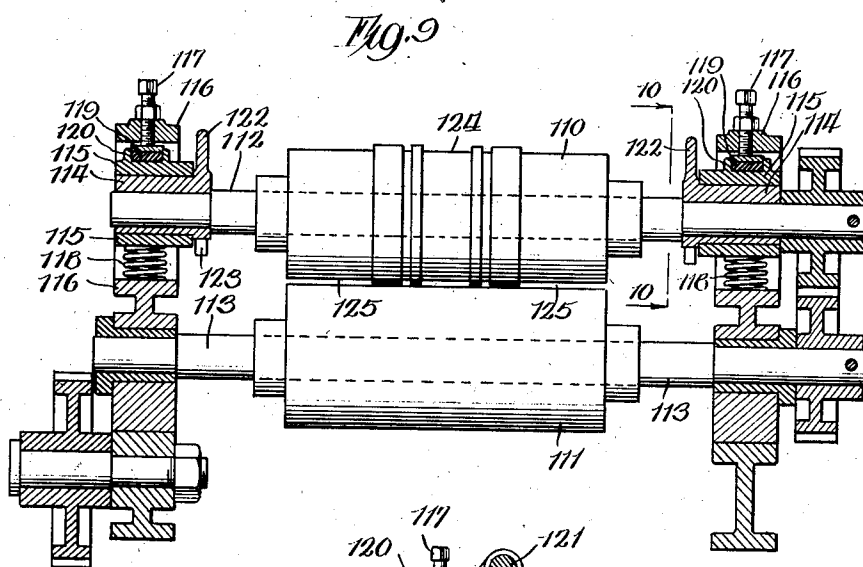
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H. G. WEBER

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16 Sheets-Sheet 6



Inventor:
Herman G. Weber
Fisher, Towle, Clapp & Jones (Attys.)

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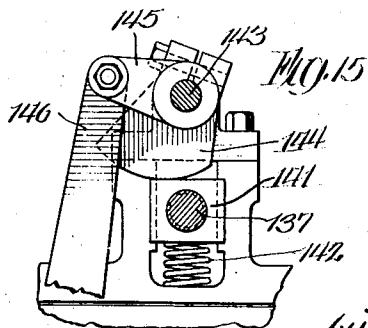
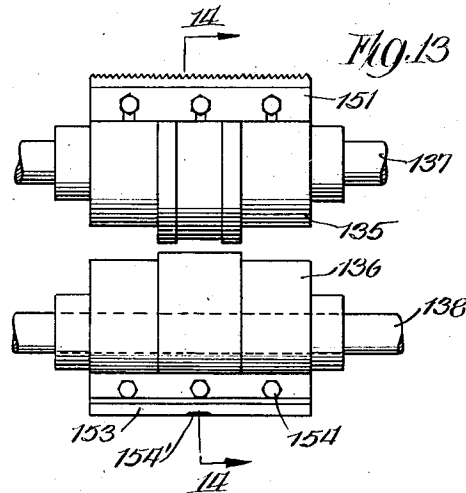
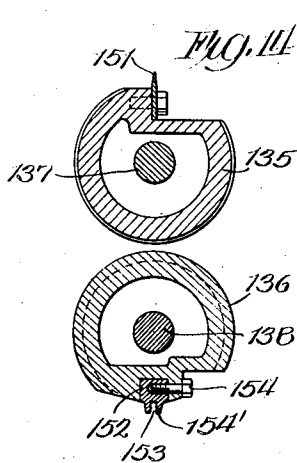
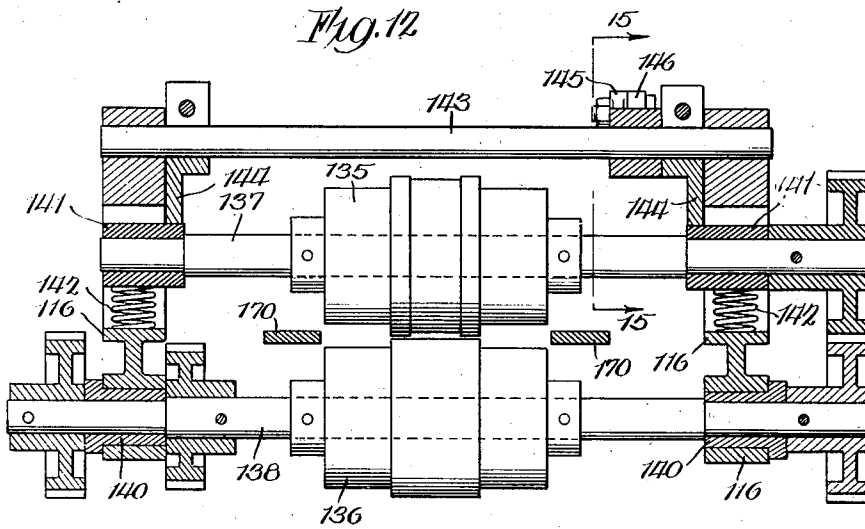
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16 Sheets-Sheet 7



Inventor:
Herman G. Weber
by Fisher, Towle, Clapp & Young
ATTYS.

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FIG. 21

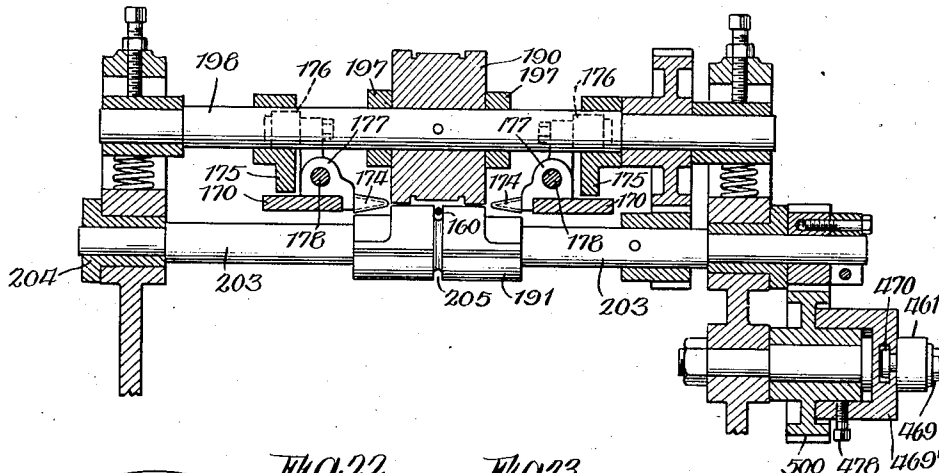


FIG. 22

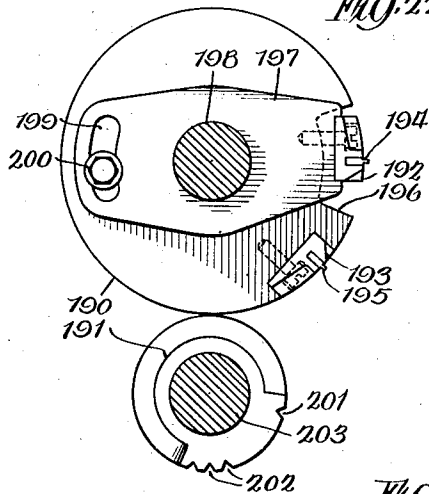


FIG. 23

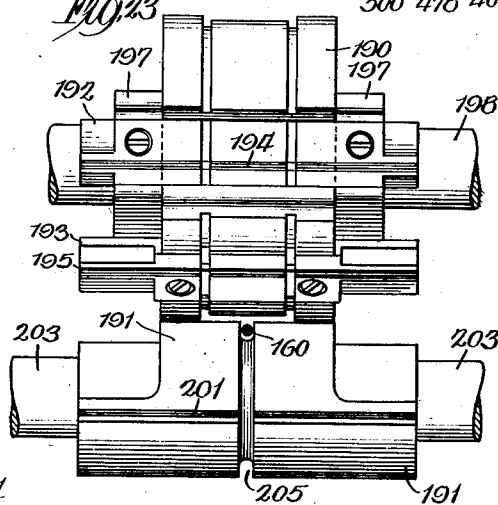
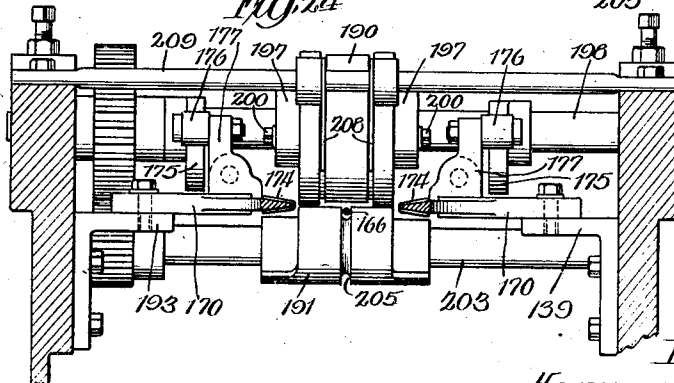


FIG. 24



Inventor:
Herman G. Weber
By Fisher, Towle, Clapp & Evans Attys.

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FIG. 25

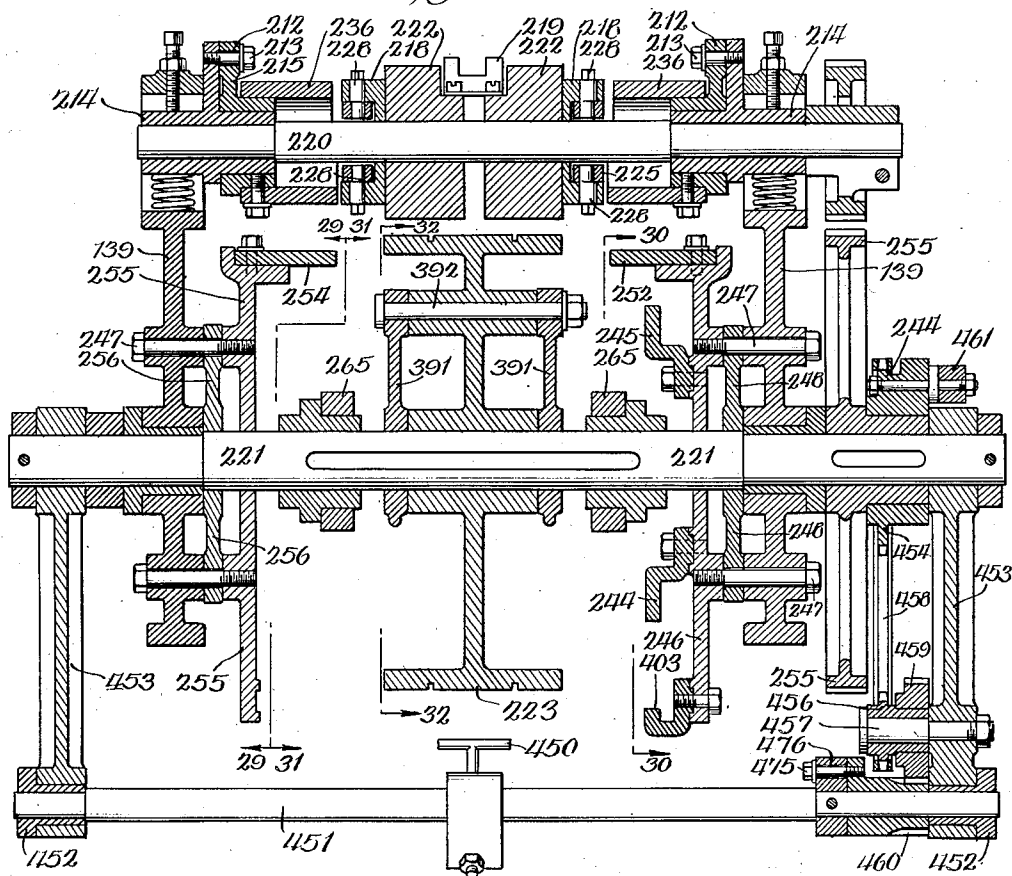
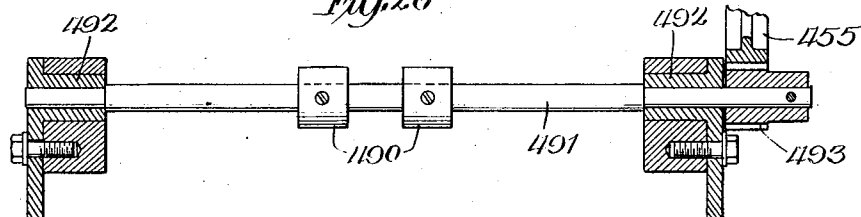


FIG. 26



Inventor:
Herman G. Weber
by Fisher, Towle, Clapp & Sons Attys

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FIG. 27

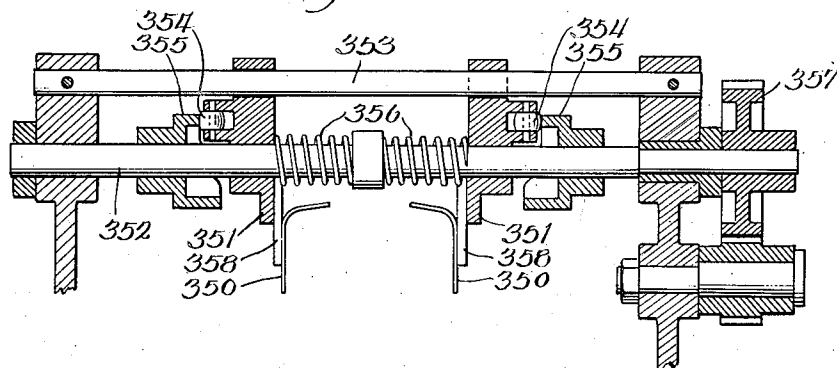


FIG. 28

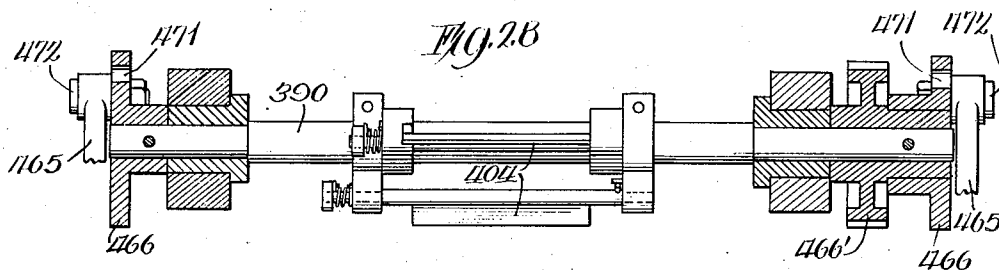


FIG. 29

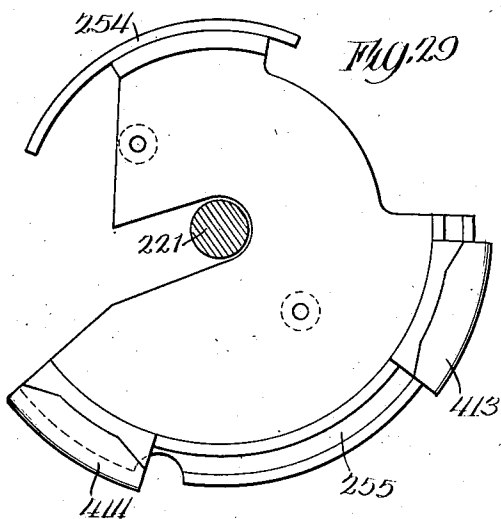
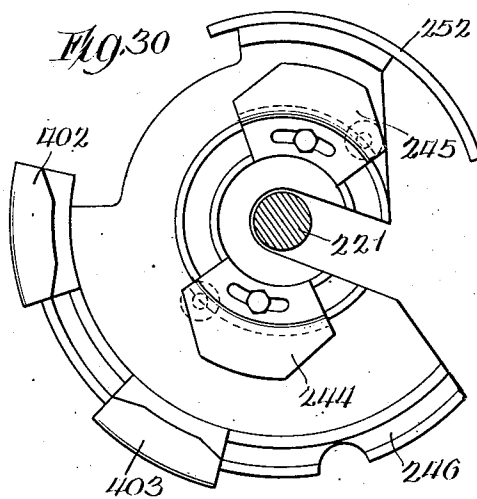


FIG. 30



Inventor:
Herman G. Weber
By Fisher, Towle, Clapp & Young (Attys.)

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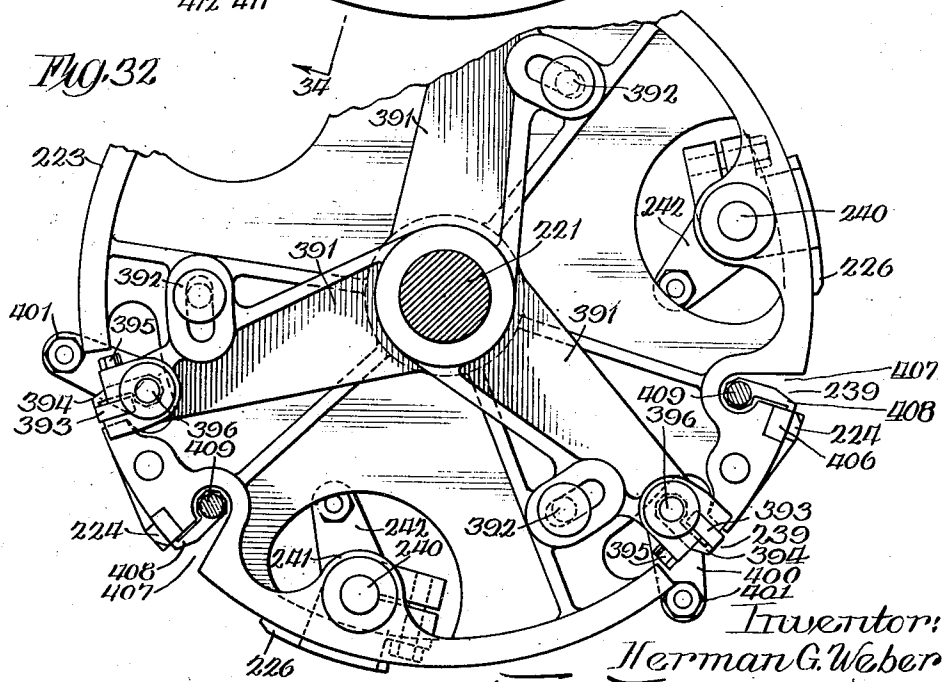
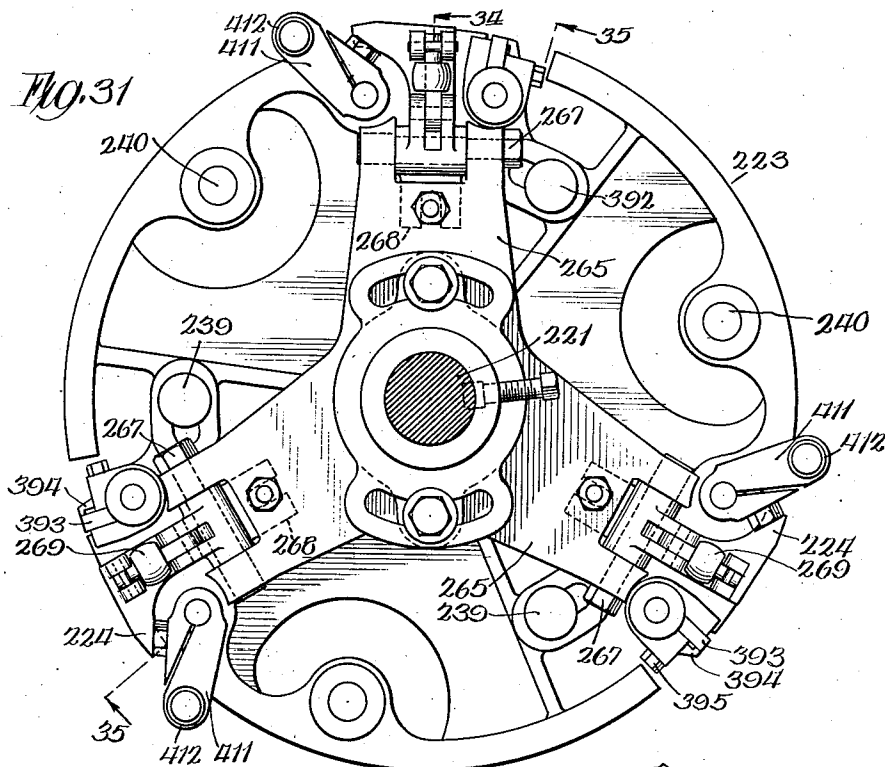
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PAPER BAG MACHINE

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16 Sheets-Sheet 12



Inventor:
Herman G. Weber
By Fisher, Towle, Clapp & Loane
Attys.

Feb. 9, 1926.

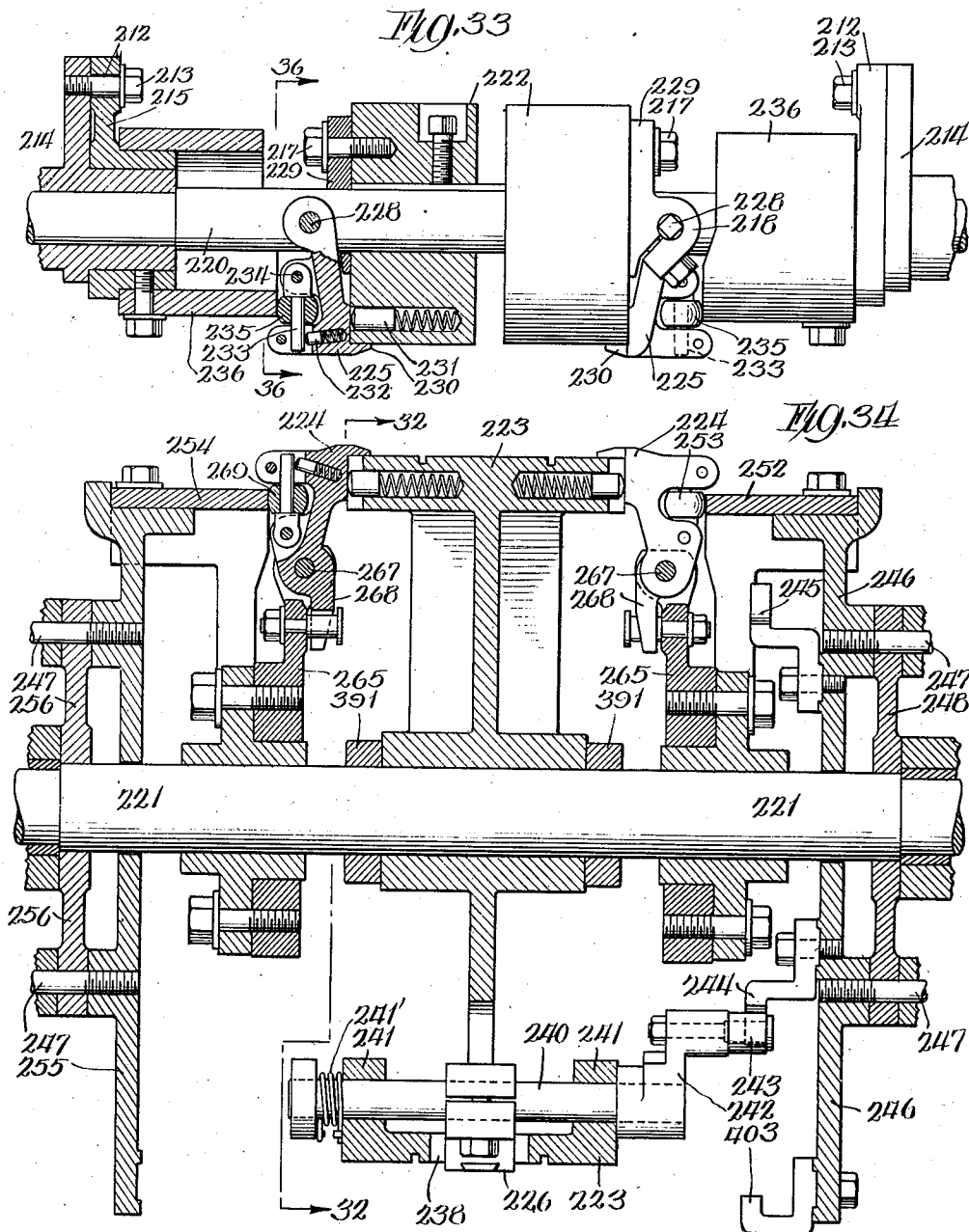
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H. G. WEBER

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16 Sheets-Sheet 13



Inventor:
Herman G. Weber
By Fisher, Towle, Clapp & Sons Attys.

Feb. 9, 1926.

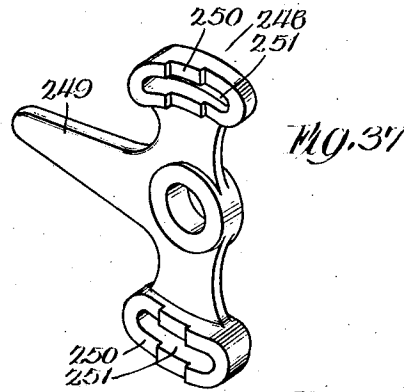
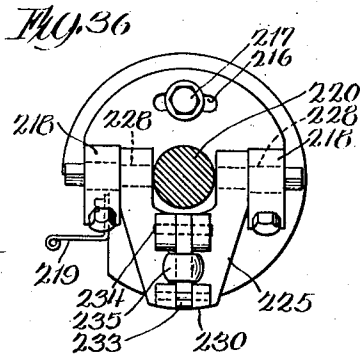
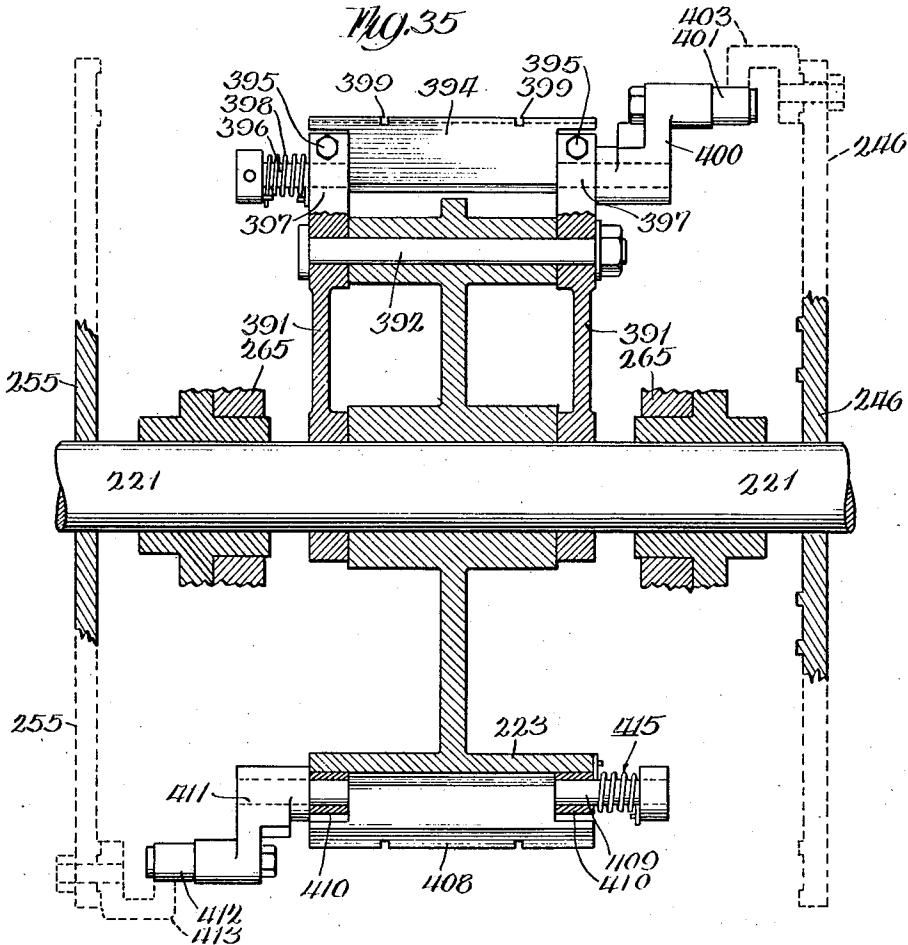
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H. G. WEBER

PAPER BAG MACHINE

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16 Sheets-Sheet 14



Inventor:
Herman G. Weber
By Fisher, Towle, Clapp & Sons
Attys.

Feb. 9, 1926.

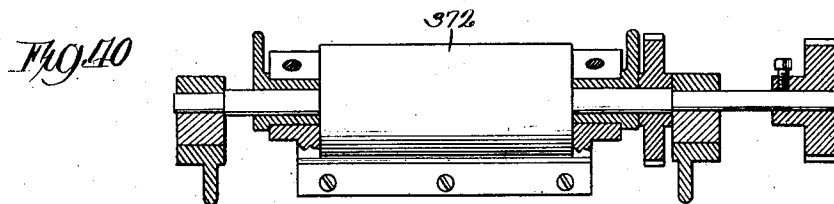
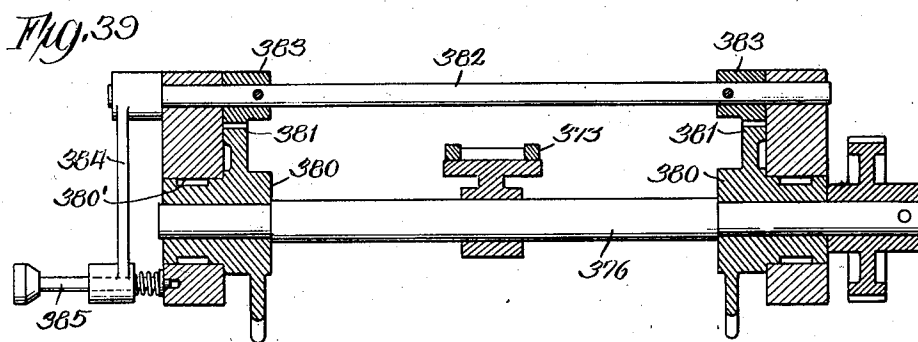
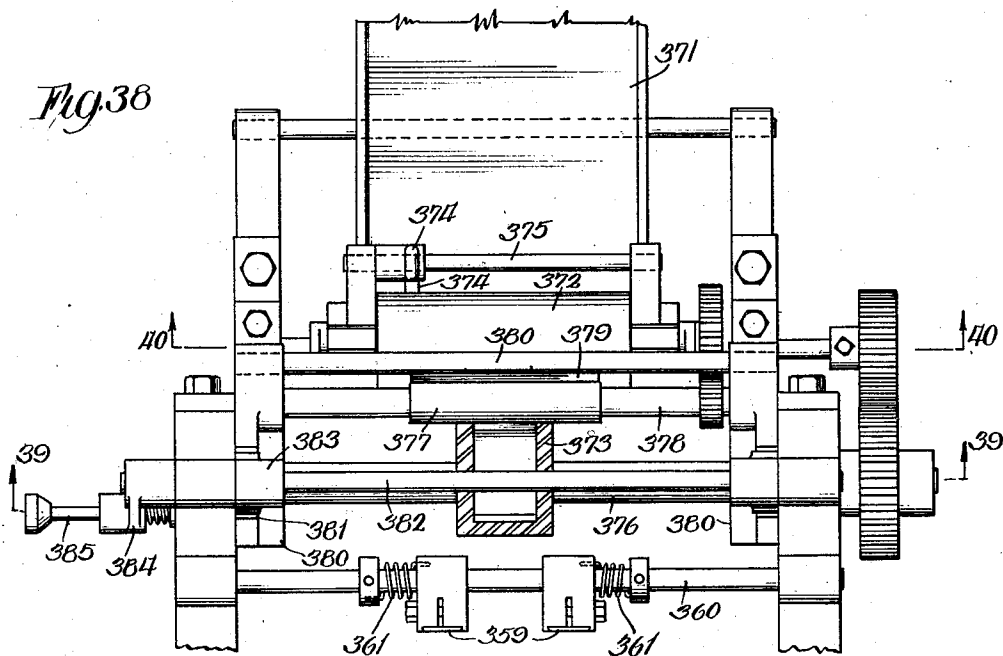
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H. G. WEBER

PAPER BAG MACHINE

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16 Sheets-Sheet 15



Inventor:
Herman G. Weber
By Fitch, Towle, Clapp & Lewis
Attys.

Feb. 9, 1926.

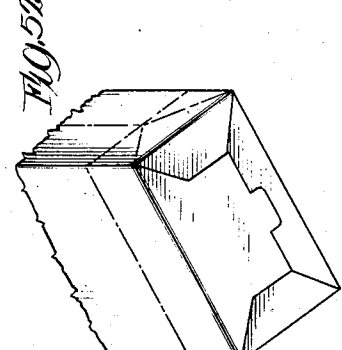
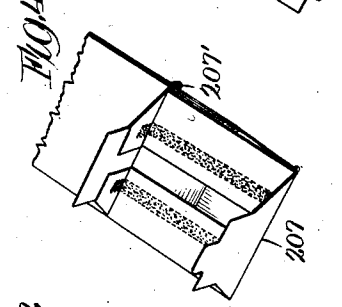
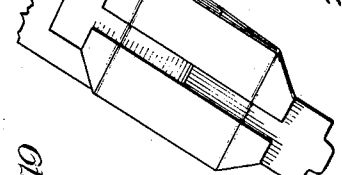
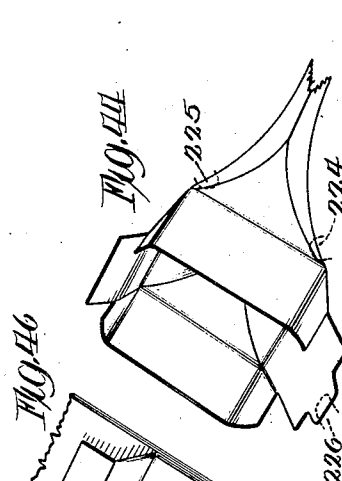
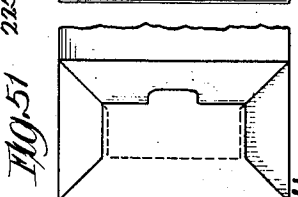
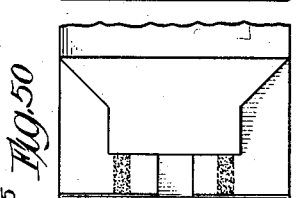
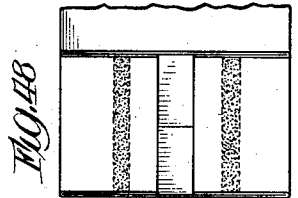
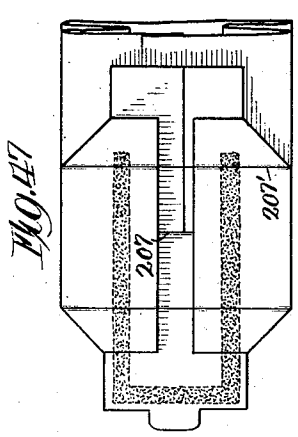
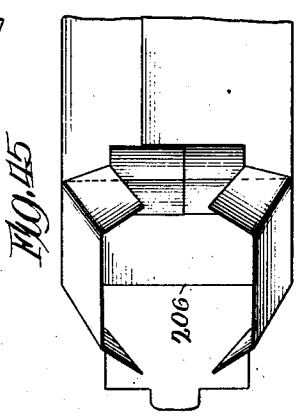
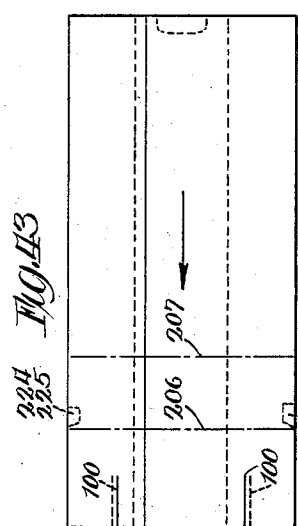
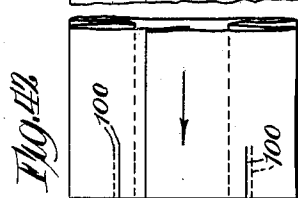
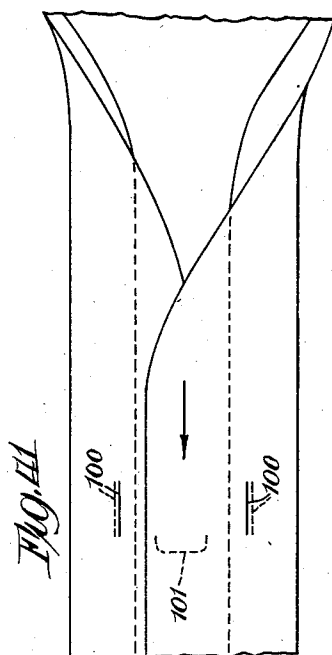
1,571,983

H. G. WEBER

PAPER BAG MACHINE

Filed Oct. 24, 1923

16 Sheets-Sheet 16



Inventor
Herman G. Weber
by
Fisher, Towle, Clapp & Sons
Attys.

UNITED STATES PATENT OFFICE.

HERMAN G. WEBER, OF MARINETTE, WISCONSIN, ASSIGNOR OF ONE-HALF TO AMERICAN LAKES PAPER COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF DELAWARE.

PAPER-BAG MACHINE.

Application filed October 24, 1923. Serial No. 670,433.

To all whom it may concern:

Be it known that I, HERMAN G. WEBER, a citizen of the United States, and a resident of Marinette, in the county of Marinette and State of Wisconsin, have invented certain new and useful Improvements in Paper-Bag Machines, of which the following is a specification.

This invention relates to machines for the manufacture of paper bags of the automatic or self-opening type and has for its primary object to provide a machine of this class which may be effectively operated at high speed.

Further objects of my invention are to provide a machine in which all movements are rotary, to eliminate pressure on the tucks during the bag forming operation, to provide a machine which is capable of handling all weights and grades of paper, to provide grippers which are self-adjusting, to apply the paste before the bottom is tucked, to provide an improved construction and arrangement of draw rolls, to provide an improved tuck opening mechanism, to enable different sizes of bags to be made on the same machine, to eliminate the necessity of using pins to open the bottom of the bag, to provide an improved guiding means for the blank, to provide an improved lip cutter, to provide an improved mechanism for severing the bag blanks from the formed tube, to provide an improved mechanism for transferring the blank from the severing rolls to the scoring rolls, to permit the use of the same scoring rolls on all sizes of bags, to provide an improved form of lip gripping mechanism, to provide an improved mechanism for ironing the side flaps, to provide an improved mechanism for applying paste to the bottom of the bag, to provide an improved arrangement of the parts and particularly of the tucking device, to provide an improved back flap-turning device, to provide an improved means for quickly adjusting the machine for different sizes of bags, and to present the bags to the gripper cylinders tangentially.

The many other objects and advantages of my invention will be better understood by reference to the following specification when considered in connection with the accompanying drawings illustrating a selected embodiment thereof, in which:—

Fig. 1 is a front elevation of one embodiment of my invention complete.

Fig. 2 is a vertical longitudinal section of a portion of the machine shown in Fig. 1.

Fig. 3 is a rear elevation of the portion of the machine shown in Fig. 2.

Fig. 4 is a plan view of a portion of the machine.

Fig. 5 is a transverse section on the line 5—5 of Fig. 2.

Fig. 6 is a detail section on the line 6—6 of Fig. 5.

Fig. 7 is a detail view of the slitting mechanism.

Fig. 8 is a detail section on the line 8—8 of Fig. 7.

Fig. 9 is a transverse section on the line 9—9 of Figs. 1 and 2.

Fig. 10 is a detail section on the line 10—10 of Fig. 9.

Fig. 11 is a transverse section on the line 11—11 of Figs. 1 and 2.

Fig. 12 is a transverse section on the line 12—12 of Fig. 2.

Fig. 13 is a detail view of a severing roll.

Fig. 14 is a transverse section on the line 14—14 of Fig. 13.

Fig. 15 is a detail view of a portion of the mechanism for operating the severing roll.

Fig. 16 is a transverse section on the line 16—16 of Figs. 1 and 2.

Fig. 17 is a detail plan view of the tuck opening mechanism.

Fig. 18 is a detail sectional view showing the tuck opening mechanism in side elevation.

Figs. 19 and 20 are detail sectional views on the lines 19—19 and 20—20 respectively of Fig. 17.

Fig. 21 is a section on the line 21—21 of Fig. 2.

Fig. 22 is a detail transverse section of the scoring roll.

Fig. 23 is a detail elevation of the scoring rolls.

Fig. 24 is a transverse section on the line 24—24 of Fig. 4.

Fig. 25 is a transverse section on the line 25—25 of Fig. 2.

Fig. 26 is a transverse section on the line 26—26 of Fig. 2.

Fig. 27 is a transverse section on the line 27—27 of Fig. 2.

Fig. 28 is a transverse section on the line 28—28 of Fig. 2.

Figs. 29 and 30 are detail sectional views on the lines 29—29 and 30—30 respectively of Fig. 25.

Fig. 31 is a vertical section on the line 31—31 of Fig. 25.

Fig. 32 is a section on the line 32—32 of Figs. 25 and 34.

Fig. 33 is a detail view, partly in section, of the upper opening roll.

Fig. 34 is a section on the line 34—34 of Fig. 31.

Fig. 35 is a section on the line 35—35 of Fig. 31.

Fig. 36 is a section on the line 36—36 of Fig. 33.

Fig. 37 is a detail perspective view of the gauge for adjusting the lower opening roll mechanism for differing sizes of bags.

Fig. 38 is a detail plan view of the pasting mechanism.

Fig. 39 is a transverse section on the line 39—39 of Figs. 2 and 38.

Fig. 40 is a transverse section on the line 40—40 of Figs. 2 and 38.

Figs. 41 and 52 inclusive illustrate the bag forming operations from the initial forming of the tube to the completed bag.

In the particular embodiment of my invention which I have chosen to illustrate the principles of construction and mode of operation, the mechanism is mounted upon a bed 60 of suitable type having supporting legs 61 secured thereto. The supply of paper is carried on the usual roll 62 mounted in brackets 63 at the end of the bed. The paper 64 is drawn through suitable printing mechanism 65 to the mechanism 66 where a supply of paste is applied to one edge prior to the formation of the tube upon the usual former or mandrel 67. The side portions of this strip are folded inwardly over the former by the infolding mechanism and the tube longitudinally tucked in the manner customary in this type of bag. As this portion of the mechanism is well known in the art and forms no part of the present invention, it will not be described in detail.

The formed tube is drawn through slitting mechanism, at 68, by rolls, at 69, and advanced to severing mechanism at 70. The severing mechanism in the present embodiment completely severs the individual bag blanks and these blanks are successively conducted to scoring mechanism at 71 by transfer rolls at 72. Upon leaving the scoring mechanism the bag is presented to the bottom forming mechanism, at 73, which completes the bag by successive steps in the manner to be presently described. The completed bag is discharged upon a conveyor, as at 74, (Fig. 2) and conducted to suitable stacking mechanism.

The slitting mechanism.

The slitting mechanism, at 68, is operated

from the main driving shaft 80 and is disposed above and below the tube former or mandrel 67. Upper and lower rotary shafts 81 and 82 respectively are mounted in supports 87 bolted to the bed. The shaft 82 is provided with fixed bearings 83, whereas the bearings 84 of the shaft 81 are adjustable. Spaced slitting blades 85 are adjustably mounted on the upper shaft 81 and similar blades 86 are secured upon the lower shaft 82. These blades slit the tube above and below in the usual manner, as indicated in Fig. 7 of the drawings. The tube former 67 is provided with the usual slots, as at 88, to permit the operation of these blades as the tube advances. A lip cutter 90 is mounted upon the shaft 82 substantially midway between the blades 86, and this cutter is provided with a substantially U-shaped blade 91 having a serrated cutting edge 92. The blade 91 is adjustably mounted upon a sleeve 93 free upon the shaft 82. A stop 94 on this sleeve is adapted to be yieldingly held against the fixed pin 95 by the spring 96 so that the blade 91 is normally held in its forward position (Fig. 6). The pin 95 is mounted upon a collar 97 fixed upon the shaft 82. The shafts 81 and 82 are preferably geared to rotate the blades 85, 86 and 91 at a higher speed than the tube is advanced along the former, so that the blade 91 would have a tendency to tear the paper if it were rigidly mounted upon the shaft 82. The blade is therefore permitted to yield sufficiently by the spring 96 so that it maintains the speed of the tube during the period of engagement therewith. As soon as the blade 91 has performed the cutting of the lip in the underface of the tube and become disengaged therefrom, it is immediately advanced to its forward position by the spring 96, the stop 94 coming in contact with the pin 95. The slits provided by the blades 85 and 86 are illustrated in Figs. 41 to 43 of the drawings as at 100. The cut produced by the blade 91 is illustrated in Fig. 41, as at 101.

The draw rolls.

After the tube has been slitted and the lip cut in the manner described, it is withdrawn from the former 67 by co-operating draw rolls 110 and 111 mounted on parallel shafts 112 and 113 respectively. These shafts are geared together and driven from the main shaft 80. The shaft 112 is mounted in oppositely disposed eccentric bearings 114 (Fig. 9) carried by adjustable blocks 115. The positions of the blocks 115 in the side frames 116 are regulated by adjusting screws 117 which press against the upper faces of these blocks. Corresponding springs 118 yieldingly press the blocks against the ends of the adjusting screws. In order to permit a slight yielding movement of the upper

roll 110 to compensate for different thicknesses of paper, cushions of rubber or other suitable material, as at 119, are preferably interposed between the ends of the adjusting screws and their corresponding blocks. Cup-shaped sockets are provided for these cushions, as at 120. The adjusting screws 117 are set to normally maintain the rolls in proper operative position. In order to facilitate the initial feeding of the tube between these draw rolls, I have provided an operating bar 121 which is connected at its ends to corresponding arms 122 on the eccentric bearings 114 so that a swinging of the bar about the axis of the shaft 112 causes the movement of this shaft toward or away from the axis of the shaft 113 with a corresponding movement of the upper draw roll. Stop shoulders 123 are provided to limit the movement of these arms. The central portion 124 of the roll 110 is preferably cut away so that no pressure is exerted upon the pasted strip at the center of the tube. Similarly the outer portions 125 are cut away to prevent pressure upon the side tucks.

The plane of the axes of the shafts 112 and 113 is preferably set at an angle to the plane of the tube as it is being drawn from the former. This is an advantageous feature as it causes the tube to contact with the periphery of the upper roll for a considerable distance before the tube passes between the rolls and thus irons out the tube and prevents wrinkling of the same. It also provides increased draft on the tube and eliminates the necessity for heavy pressure by the rolls which would otherwise be required. This angular disposition also tightens the paper about the former or mandrel and prevents spreading of the tube.

The severing mechanism.

The formed and slitted tube is advanced by the draw rolls to the severing mechanism 70 which in the present embodiment completely detaches the bag blank. The severing rolls 135 and 136 are geared to the main driving shaft and preferably constantly rotate at the same peripheral speed as the draw rolls. These rolls are spaced more than is customary in such mechanisms until the cutting blade substantially is in position to sever the blank. The upper roll 135 carrying this blade is then given a sudden thrust toward the lower roll, projecting the blade substantially directly into the notch in the co-operating female severing member on such lower roll. The blade is then almost instantly withdrawn therefrom by a like movement.

The severing rolls 135 and 136 respectively are mounted on corresponding revoluble shafts 137 and 138 supported in the side frames 116. The bearings 140 of the shaft

138 are fixed in the present embodiment but the bearings 141 of the shaft 137 are slidably mounted in the side frames to permit this shaft to be moved toward and from the shaft 138. The shaft 137 is normally forced away from the shaft 138 by springs 142 which act against the bearings 141. An oscillating cam shaft 143 is mounted in the side frames above the upper severing roll and carries a pair of cams 144. These cams co-act with the corresponding bearings 141 to cause the shaft 137 to be moved toward the shaft 138 against the action of the springs 142 for the purpose which will be presently described. An arm 145 fixed upon the shaft 143 is pivotally connected at its outer end to an operating member 146 (Fig. 2). The member 146 is provided with an elongated slot 147 through which passes a cam shaft 148 having a cam 149 secured thereon. A cam roll 150 is mounted on the lower end of the member 146 to co-act with the cam 149 to cause this member to be moved substantially longitudinally and to thus provide the oscillation of the shaft 143. The shaft 148 is geared to the shaft 138.

The severing blade 151 is adjustably mounted on the roll 135 to completely detach the blanks successively from the tube. The roll 136 is provided with a female cutting member 152 having a slot 153 therein to receive the blade 151. This member 152 in the present embodiment consists of an elongated block secured in the periphery of the roll by means of screws 154. This block is centrally notched, as at 154', to prevent the lip 101 being severed from the blank by the blade 151.

In each revolution of the severing rolls the blade 151 is brought into registration with the notch 153 in the block 152 and at this time the nose 155 on the cam 149 comes into engagement with the roller 150 on the member 146, producing a sudden longitudinal movement of the member 146. This movement of the member 146 causes the shaft 143 to partially rotate and the shaft 137 to be thrust toward the shaft 138 by the cam 144, projecting the blade 151 into the notch 153 and severing the blank. The cam 149 is preferably so shaped that the roller 150 will almost instantly ride off the nose 155, permitting the member 146 to move upwardly and the cams 144 to resume their normal position. The roll 135 is moved away from the roll 136 by the springs 142. The formation of the cam 149 in the present embodiment is such that the severing rolls are farthest apart at the time the blank enters, gradually being moved nearer during the advance of the blank until the sudden thrust is imparted to the upper roll to sever the blank. This thrust movement of the blade is particularly advantageous as it permits the notch 153 to be made very nar-

row and thus produces a better cut than is possible with the usual construction in which the notch is necessarily wide or flaring to permit entry and withdrawal of the blade during the rotary movement of the rolls.

The transfer rolls.

Upon leaving the severing rolls the blank is guided in its advance to the transfer rolls 161 and 162 by a substantially centrally located wire guide 160. These rolls 161 and 162 are disposed respectively above and below the blank, the lower roll 162 in the present embodiment being mounted in fixed bearings 164 in the frame, whereas the bearings 165 of the roll 161 are adjustable for different thicknesses of paper. The lower roll 162 is provided with a central peripheral groove 163 to admit the guide 160. This guide 160 prevents the bending down of the lip on the blank and thus facilitates the entrance and engagement of the lip gripper of the bottom forming mechanism. The transfer rolls are preferably so formed that no pressure is exerted upon the edge or tucked portions of the blank or upon the central pasted strip.

The peripheral speed of the transfer rolls is preferably the same as that of the draft and severing rolls, but in view of the fact that a slight checking of the advance of the blank occurs at the instant of operation of the severing blade, it has been found advisable to permit a limited amount of slippage of the blank between the transfer rolls at this time. This is advantageous as it eliminates the tendency of the blank to buckle. The bearings 165 of the upper shaft 161 are preferably yieldingly supported on cushions 166 of rubber or other suitable material.

The tuck opening mechanism.

Tuck opening mechanism is provided to enter and expand the side tucks so that the blank may be readily engaged by the grippers of the bottom forming mechanism when presented thereto. In the present embodiment this tuck opening mechanism comprises primarily a pair of oppositely disposed blades 170 which preferably extend longitudinally of the path of the blank from a point in front of the severing rolls substantially to the bottom forming mechanism. The wedge-shaped forward end 171 of each of these blades enters the corresponding tuck as the blank emerges from the draw rolls. These blades are normally stationary and are adjustably mounted at one end on a transverse rod 172 (Figs. 4 and 24) and at the opposite end on brackets 139 so that they may be moved in or out for different sizes of bags. In order to permit the scoring mechanism to operate substan-

tially across the entire blank, each of these blades is preferably cut away at 173 (Fig. 17) and a reciprocating bridge 174 (Figs. 17-20) provided to conduct the blank across the gap during the interval between the successive engagements of the scoring blades. This bridge is fixed on a rod 178 slidably mounted in bearings 179 on the blade 170. The bridge is moved to open the gap by means of a cam 175 which acts upon a cam roller 176 carried by an arm 177 on the rod 178. As soon as the roller 176 moves off the raised portion of the cam 175 the bridge 174 is moved to close the gap by a spring 180 connected to one end of the rod 178. The bridge is advanced and enters the tuck as the forward end of the blank passes between the scoring rolls and it lies within the tuck just in front of the score line at the time of operation of the forward scoring blade. It then moves with the blank across the gap until it contacts with and forms a continuation of the blade beyond the gap. A slight flare, as at 181, is preferably given to the blade 170 just in front of the gap 173 to spread the tuck at this point and thus facilitate the entry of the bridge. A similar gap 182 is preferably provided in each of the blades 170 at the point of operation of the severing rolls, but no bridge is necessary at this point. This bridge construction at the scoring position is a particularly advantageous feature.

The scoring mechanism.

The scoring mechanism shown principally in Figs. 21 to 24 inclusive comprises a pair of co-operating scoring rolls 190 to 191 operated by gearing from the main drive shaft. The upper roll 190 in the present embodiment is provided with two scoring bars or blocks 192 and 193 respectively provided with scoring blades 194 and 195. The rear scoring block 192 is made adjustable to permit the same block to be used for all sizes of bags. The block 193 is preferably stationarily mounted in the periphery of the roll. The block 192 is disposed within a longitudinal channel 196 in the roll and its ends are supported by oppositely disposed members 197 revoluble on the shaft 198. An arcuate slot 199 is provided in the member 197 to admit the binding screw 200. This block 192 is adjusted by loosening the screws 200, swinging the members 197 on the shaft 198 to obtain the proper positioning of the blade 194 and then tightening these screws. The lower scoring roll 191 is provided with notches to receive the blades on the upper roll. As the forward block 193 is not adjustable a single notch 201 is provided to receive the blade in this block. A series of notches, as at 202, has been provided to receive the blade 194 in its different adjusted positions. The present embodiment shows

three notches in this series corresponding to the adjusted positions of the blade 194 for a like number of different sizes of bag. The upper roll makes one revolution for each blank. The lower roll 191 is shown with a diameter one-half that of the upper roll and it makes two revolutions for each revolution of the upper roll. This permits the scoring rolls to be brought nearer the bottom forming mechanism and provides a sharper score than would be possible if the lower roll were of the same diameter as the upper roll.

The shaft 203 carrying the lower scoring roll 191 is mounted in a fixed bearing 204 in the frame, whereas the shaft 198 is adjustable for different thicknesses of paper. The lower scoring roll is preferably centrally grooved, as at 205, to permit the passage therethrough of the guide wire 160. The transverse scores provided by the blades on the roll 190 are indicated on the blank as 206 and 207 (Fig. 43). A pair of guides 208 is mounted upon a transverse rod 209 in rear of the scoring mechanism to disengage the blank from the upper scoring roll and direct its advance to the bottom forming mechanism.

The bottom forming mechanism.

This mechanism comprises upper and lower cylinders or drums 222 and 223 and a series of devices operating in co-operation therewith. The cylinders 222 and 223 are respectively mounted upon shafts 220 and 221 supported by the side frames and geared to the main drive shaft. These cylinders rotate continuously in opposite directions at the same peripheral speed as the scoring rolls which advanced the blank thereto. The blank enters the interval between the cylinders 222 and 223 tangentially to these cylinders. This is an advantageous feature. At this time the lip on the blank is engaged by a gripper 226 on the cylinder 223 and pressed firmly against this cylinder. Grippers 224 on the same cylinder swing inwardly from opposite sides thereof and enter the side tucks of the blank immediately in rear of the forward score, pressing the lower part of the blank and the adjoining portion of the tuck against the cylinder. Simultaneously grippers 225 on the upper cylinder swing inwardly above the corresponding grippers on the lower cylinder and press the upper part of the blank in a similar manner against the upper cylinder. A presser foot 219 on the upper cylinder 222 presses the lip of the blank upon the lower cylinder before the lip gripper 226 closes. This presser foot is preferably fork-shaped and the lip gripper passes between the tines thereof. The cylinder 222 makes one revolution for each blank fed thereto, whereas the cylinder 223 makes a single revolution for each three blanks, there being three blank positions on this cylinder.

The details of construction of the upper opening cylinder 222 are fully shown in Figs. 33 and 36 of the drawings. This cylinder in the present embodiment is made in two parts slightly spaced and mounted upon the shaft 220. The gripper construction on each end of this roll is the same except that the position of the parts is reversed and therefore only one of these grippers will be described in detail. The gripper 225 is trunnioned on the inner ends of oppositely disposed studs 228 supported by eccentric bearings 218 on the plate 229 which is adjustably mounted on the end of the cylinder 222. A finger 230 on the gripper overlies the edge portion of the periphery of the cylinder and co-acts therewith to hold the blank. The position of the gripper for different sizes of bag is adjusted by loosening the screw 217, rotating the plate 229 about the axis of the shaft 220 a sufficient distance and then tightening this screw. This rotation is permitted by the arcuate slot 216 in the plate. The grippers are adjusted on the plate by rotation of the studs 228 in their eccentric bearings. This moves the finger 230 toward or from the periphery of the cylinder and is the method of compensating for wear of the fingers. The gripper is normally pressed away from the end of the cylinder by a spring plunger 231 seated in the cylinder. A similar plunger 232 is mounted in the gripper and its rear end is adapted to be pressed by a lever 233 pivotally mounted at 234 and carrying the cam roll 235. The roll 235 co-acts with an operating cam 236 secured on the hub of a plate 215 adjustably mounted on the bearing 214 supporting the shaft 220. The cam 236 is adjusted for different sizes of bag by loosening the stud bolt 213 and rotating the plate 215 about the bearing 214. This is permitted by the arcuate slot 212 in the plate 215 through which the bolt 213 passes. When the roll 235 is pressed inwardly by the cam 236 the lever 233 swings upon its pivot 234 and presses against the plunger 232. As the spring for this plunger 232 is made slightly stronger than the corresponding spring of the plunger 231, the inward movement of the roll in the manner described causes the gripper to swing upon its pivot 228, carrying the finger 230 inwardly over the periphery of the cylinder and downwardly until it yieldingly presses against such periphery. When this lever has forced the gripper to its seat the lever continues to advance slightly, and this further movement is permitted by the plunger 232. The amount of this lost motion depends upon the thickness of the paper. This action of the gripper is very advantageous as the gripper will automatically adjust itself to any thickness of paper. The cams 236 are tubular in shape and concentric with the shaft 220,

The operating face is formed on the end of the tube.

The lower or large bottom forming cylinder 223 in the present embodiment is provided with three sets of mechanisms to operate on successive blanks. Each of these sets comprises a lip gripper 226 located at substantially the central portion of the periphery and projecting through a slot in the wall thereof, a pair of side grippers 224 similar to the grippers 225 on the upper cylinder, and front and rear pinch bars 239. The gripper 226 is mounted upon a shaft 240 supported in the side walls 241 of the cylinder and carrying on one extremity an operating arm 242. A spring 241' normally holds the gripper in closed position. A cam roller 243 is mounted in the outer extremity of this arm and is adapted to co-act with operating cams 244 and 245 adjustably secured upon the cam plate 246 fastened to one of the side frames 139 by screws 247. An adjusting member or gauge 248 (Fig. 37) is interposed between the plate 246 and the frame to permit all the cams upon this plate to be simultaneously adjusted for different sizes of bag. This member 248 is provided with an operating handle 249 and comprises a pair of adjusting cams 250 on the ends of oppositely extending arms. In the present embodiment each of these cams has three seats or positions which properly set the cam plate 246 for a corresponding number of different sizes of bag. More seats would be provided if the machine were to be used for more than this number of bag sizes. The screws 247 (Fig. 25) would be loosened prior to making the adjustment and then tightened to lock the cam plate in its adjusted position. These screws pass through corresponding arcuate slots 251 in the cam adjusting member. A cam 252 is secured upon the plate 246 to co-act with the cam roller 253 on one of the side grippers 224 to move this gripper into position to secure the blank at the proper time and to permit the release of this gripper when the blank has been advanced sufficiently by the lower opening cylinder. The gripper 224 on the opposite side of the cylinder 223 is similarly actuated by a cam 254 carried by a cam plate 255 adjusted for different sizes of bag by an adjusting member or gauge 256 corresponding to the member 248.

Side grippers 224 are mounted upon corresponding arms of an adjustable spider 265 secured upon the shaft 221 carrying the cylinder 223. The gripper is pivotally mounted on a stud 267 and provided with a stop arm 268 which limits the movement thereof. The operating mechanism of the gripper is substantially the same as that of the gripper 225 on the upper cylinder and the same self-adjustment for different thicknesses of paper is provided. The cam rolls

253 and 269 co-operate with their corresponding cams 252 and 254. The pinch bars 239 are adapted to grip and crease the bottom portion of the bag transversely along the lines of fold of the front and rear flaps to enable these flaps to be readily turned or folded into proper position to close the bottom of the bag. The studs 267 are mounted in eccentric bearings so that a rotation of these studs will cause the normal positions of the corresponding grippers 224 to be adjusted to compensate for wear on the grippers.

The side-flap folding mechanism.

As soon as the bottom of the bag has been opened by the cylinders or drums 222 and 223, the grippers on the cylinder 222 release, the grippers on the cylinder 223 continuing to hold the blank. The advance of the lower opening cylinder brings the bottom of the blank opposite folders 350 (Fig. 27) which turn the side flaps inwardly. In the present embodiment these side flap folders are of the plow type and are mounted on the holders 351 which are slidable on the shaft 352. A guide rod 353 passes through these holders to maintain the folders in proper position. A cam roller 354 is mounted in each of these holders and co-acts with a corresponding cam 355 secured to the shaft 352. These cams slide the holders inwardly to fold the flaps and permit them to return under the action of springs 356 during each revolution of the shaft. The shaft 352 is geared to the main driving shaft. While I have found that it is advantageous to reciprocate the side flap folders in the manner described, it should be distinctly understood that these folders will operate entirely satisfactorily when permitted to remain stationary. The gear 357 is removed from the shaft 352 when the folders are to be retained in stationary position. The folders are connected to their respective holders by means of adjustable arms 358. Side flap ironers 359 (Figs. 2 and 38) engage the side portions of the blank as it emerges from the folders 350 and firmly press these flaps into folded position. These side flap ironers preferably extend beyond the paste-applying position and thus prevent wrinkling of the blank on the lower cylinder. Each of these side flap ironers consists of a strip of spring metal extending about the periphery of the cylinder 223 along the path followed by the corresponding side flap of the blank. These ironers are mounted upon the shaft 360 supported by the side frames of the machine and pressed against the lower cylinder by springs 361.

The paste-applying mechanism.

The paste-applying mechanism 370 is mounted on the side frames of the machine

adjacent to the lower opening cylinder 223 and comprises a reservoir 371 to contain the paste supply, a feed roll 372, and a revoluble die 373 which receives an application of
 5 paste from the roll 372 and imprints it on the blank. A manually operable agitating and spreading blade 374 is slidable transversely of the reservoir 371 upon a guide rod 375. This blade removes any lumps or
 10 foreign matter which might otherwise prevent the uniform distribution of paste over the operative face of the die.

When a machine of this type is operating at high speed considerable paste is thrown
 15 out by the die 373 and the roll 372. To catch this I have formed a roll 377 upon a revoluble shaft 378 directly above the line of contact of the roll 372 with the die 373. This roll is geared to the shaft carrying the
 20 roll 372. A scraper 379 extends longitudinally of the roll 377 in contact therewith to remove the paste therefrom and cause the same to return to the reservoir. The die 373 is of the usual U-shaped type. The
 25 shaft 376 is revolubly mounted in bearing blocks 380 slidable in guide slots 380' and having racks 381 formed thereon. A shaft 382 is mounted in the side frames substantially directly above the shaft 376 and this
 30 shaft is provided with segmental pinions 383 fixed thereon. The shaft 382 is provided with an operating handle 384 adapted to permit this shaft to be manually rotated. The partial rotation of the shaft 382 pro-
 35 duces sufficient movement of the bearing blocks 380 to move the die 373 out of operative position against the action of springs 373'. The die 373 is normally held in
 40 operative position by the spring plunger 385. This mechanism enables the die to be quickly moved out of operative position when there is no blank upon the lower opening cylinder to receive the paste. The normal
 45 position of the shaft 376 is regulated by adjusting screws 386 (Fig. 1).

The tucking mechanism.

The tucking mechanism comprises front and rear pinch bars on the lower cylinder
 50 and corresponding blades mounted on a revoluble shaft 390 adjacent thereto. The rear pinch bar mechanism is mounted upon spiders 391 supported upon the shaft 221 on
 55 opposite sides of the cylinder 223. These spiders are connected by bolts 392 which permit adjustment of the spiders for different sizes of bag. This rear pinch bar mechanism comprises a fixed jaw 393 and a
 60 swinging jaw 394 extending entirely across the lower cylinder 223 in a slot provided for the purpose. The fixed jaw 393 is positioned in the spiders by screws 395. The
 65 swinging jaw 394 is fixed upon a shaft 396 supported by the spiders at 397. A spring 398 on the shaft 396 acts to normally hold

the jaw 394 in closed position. This jaw is notched, as at 399, to permit a stripper to operate to remove the blank at the completion of the forming operation. An arm 400
 70 is fixed upon the rod or shaft 396 and a cam roller 401 is mounted on the outer end of this arm. This roller co-acts successively with cams 402 and 403 on the cam disk
 75 246 (Fig. 30). The cam 402 opens the jaws to permit the tuck to be forced therein by the rear blade 404 on the shaft 390. As soon as the roller passes off the cam 402 the jaws
 80 close and remain closed until the roller is again actuated by the cam 403 to open the tuck and permit the same to be withdrawn. The forward pinch bar mechanism is similar
 85 in construction and mode of operation to the rear mechanism for the same purpose. The block 406 forming the stationary jaw is mounted on the cylinder 223 in the trans-
 90 verse slot 407. Different sizes of blocks are used for different sizes of bags. The swinging jaw 408 is mounted on the pivot rod or shaft 409 supported by bushings 410 in the
 95 cylinder (Fig. 35). An arm 411 is secured on the ends and a cam roller 412 is mounted on the outer end of this arm. The roller 412 successively co-acts with operating cams
 100 413 and 414 (Fig. 29) on the cam plate or bracket 255 in the same manner and for the same purpose that the cam roller in the rear
 105 tucker engages the cams 402 and 403 on the opposite plate. The spring 415 on the rod or shaft 409 operates to normally maintain the jaw 408 in closed or gripping position.
 110 The tuck is forced between the jaw 408 and the block 406 by the forward blade 404 when the jaw 408 is in open position. The rear pinch bar releases immediately after the
 115 rear flap has been turned in the manner to be presently described. The forward pinch bar releases as soon as the front flap has been turned.

It should be noted that the blank is tucked
 120 subsequent to the application of paste to the bottom thereof. This is important as it insures a tight bag. The paste will not properly go into the tucks when the bag is tucked
 125 prior to the application of the paste.

The back-flap turning device.

The tucked blank is next presented to the
 130 back flap turning device by the lower cylinder 223, both flaps being held in bent-up position by the pinch bars. The turning of the back flap is accomplished by an operat-
 135 ing arm 450 which moves at a more rapid rate than the blank. This arm carries the rear flap forwardly and presses it firmly against the gummed bottom of the bag.
 140 This arm operates by a combined movement to accomplish its function and is adjustably mounted on a shaft 451 (Figs. 3 and 25)
 145 supported in bearings 452 in the outer ends of arms 453 free on the lower cylinder shaft

221. A sprocket 454 is loosely mounted on the hub of the gear 455. A similar sprocket 456 is revolvably mounted on a short shaft 457 supported by one of the arms 453 (Fig. 25). A chain 458 operatively connects these sprockets. A pinion 459 is fixed upon the hub of the sprocket 456 and meshes with a gear 460 fixed on the shaft 451. A connecting rod 461 joins the sprocket 454 with the gear 500 driven from the main drive shaft, so that the continuous rotation of this gear imparts an oscillating movement to the shaft 451 in its bearings. The gear ratio in the gears 459 and 460 causes the arm 450 to swing at a greater speed than the blank is advanced by the cylinder 222. A swinging movement is likewise imparted to the shaft by connecting rods 465. One end of each of these rods is pivotally connected to the corresponding disk 466 fixed on the shaft 390 (Fig. 28). A gear 466' on this shaft meshes with the gear 455. The outer extremity of each of these rods 465 is joined to a fork 468 on the corresponding arm 453 by a pivot pin 467. The swinging movement of the shaft 451 and supporting arms causes the back-flap turning arm 450 to follow the paper and, at the proper time, the arm is given a sudden throw or partial rotation about its shaft by the rod 461. This rotation performs the turning down of the rear flap. The connecting rods 461 and 465 then return the arm 450 to its initial position (Fig. 3). The swinging movement of the shaft 451 is adjusted by means of the connection of the rod 465 with the disk 466. A series of holes 471 is provided in this disk and the bolt 472 is placed in the proper hole for the particular size of bag. The extent of oscillation of the shaft 451 in its bearings is adjusted by means of the bolt 469 which connects the rod 461 to the gear 500. A cap 469', fitting on the hub of the gear 500, is provided with a T-shaped slot 470 in which the head of this bolt lies. The adjustment is accomplished by loosening the head on the bolt, sliding the bolt toward or from the center of the gear and tightening the nut in the proper adjusted position. The position of the arc through which the arm 450 swings is adjusted by shifting the position of the gear 460 on the shaft 451. This gear is secured upon the shaft by a screw 475 which passes through an arcuate slot 476 in a collar 477 fixed on the shaft. To perform this adjustment the screw is loosened, the gear rotated relative to the shaft to the proper position, and the screw then tightened to lock the gear in its adjusted position. Shifting the position of the bolt 472 in the disk 466 advances or retards the swinging movement of the shaft 451 to cause this movement to take place at the proper time for the particular size of bag. Adjustment of the timing of the oscillation

of the shaft 451 in its bearings is accomplished by shifting the position of the cap 469' on the hub of the gear 500. This cap is secured to the hub by set screws 478. To perform this adjustment, loosen this set screw, rotate the cap on the hub to the proper position, and tighten the screw to lock in adjusted position. The main adjustment of the throw of the arm 450 is accomplished at this point. The finer adjustment is provided by adjusting the gear 460 in the manner described. It will thus be evident that a completely positive movement of the back-flap turner is accomplished without the use of cams or springs. This is particularly advantageous.

The front-flap turning device.

After the back flap has been turned by the arm 450, the forward end of the blank passes between the cylinder 223 and rollers 490. These rollers are carried by the shaft 491 Fig. 26 eccentrically mounted in bearings 492 adjustable in the side frames. These rollers firmly press the front flap rearwardly upon the gummed bottom of the blank and complete the bag. The rollers 490 are actuated by a pinion 493 on the roller shaft 491 which is driven by the gear 455 on the shaft 221. The completed bag is then disengaged from the bottom opening cylinder by the stripper 494 Fig. 2 and falls upon the conveyer 74 which conducts it to some suitable form of stacking mechanism (not shown).

The operation.

To prepare the machine for power operation, the paper is manually drawn from the supply roll and threaded through the various mechanisms to the draw rolls. The upper draw roll is manually lifted by means of the bar 121 to facilitate the entry of the tube between these rolls and then depressed to bring the rolls into operative position. The mode of operation of the various mechanisms for forming and printing the tube will not be described as these mechanisms are of well known construction and form no part of the present invention.

The formed tube (Fig. 41) is advanced by the draw rolls to the slitting mechanism which forms four slits therein as indicated at 100, two being in the upper layer and a like number in the lower layer of the tube. At the same time the lip cutter makes the substantially U-shaped cut 101 in the lower layer of the tube to form the lip. The slitted tube then leaves the former or mandrel and passes between the draw rolls.

The angular disposition of the plane of the axes of the draw rolls relative to direction of approach of the tube causes the upper face of the tube to contact with the periphery of the upper draw roll a consider-

able distance in advance of the line of pressure of the rolls. This contact is particularly advantageous as it causes the tube to be ironed out before passing between the rolls and also tightens the paper upon the tube former, thus preventing spreading of the tube which otherwise would be liable to occur. The outer portions of the draw rolls are preferably cut away in the manner described to prevent the closing and creasing of the side tucks in the tube.

The tube is advanced by the draw rolls to the severing rolls which are preferably rotating continuously at the same peripheral speed as the draw rolls. These severing rolls are spaced more than is customary in such devices and a sudden thrust of the upper roll toward the lower roll is imparted by the cam actuated mechanism at the instant that the severing blade comes opposite the female severing member in the lower roll. The upper roll is immediately raised, withdrawing the blade from the notch in the female member. This sudden thrust and withdrawal of the blade is particularly advantageous as it permits a narrow slit or notch in the female member and insures a smooth cut of the paper even when the machine is operating at extremely high speed. The lip is not cut by the severing blade as the front wall of the female severing member is slightly notched or cut away, as described, to prevent any cutting action of the blade at this point. The severed front end of the blank is shown in Fig. 42 of the drawings.

In the present embodiment of my invention, I have provided transfer rolls to conduct the severed blank from the severing rolls to the scoring rolls. These would not be necessary if the scoring rolls were located sufficiently near to the severing mechanism but are found to be advantageous in insuring a proper feeding of the blanks to the scoring mechanism. These rolls are preferably adapted to permit a limited amount of slippage of the blank therebetween as a slight checking of this blank occurs when the next succeeding blank is severed therefrom.

The side tuck openers in the present embodiment enter the tucks in the blank in front of the severing rolls and extend from this point to substantially the line of contact of the bottom opening cylinders. This is very advantageous. These tuck openers are in the form of stationary wedge-shaped blades extending longitudinally of the blank and projecting into the tucks. These blades enter the open forward ends of the tucks as the blank approaches the severing rolls and by a wedging action expand the tucks to permit the gripper fingers to readily enter. The reciprocating bridges at the scoring position are very advantageous as they

eliminate danger of the tucks becoming closed by the action of the scoring blades. The bridges are in their rearmost position and within the tucks in the forward end of the advancing blank when the forward scoring blade comes into contact with the blank and they then move forward with the blank just in front of the scored line until the stationary portion of the tuck openers has entered this forward end of the tuck. The bridges are retracted by their respective springs in readiness to enter the tuck in the next blank and repeat the operation.

The scoring rolls operate with the same peripheral speed as the previously described rolls. These rolls cause the blank to be scored in the manner indicated at 206 and 207 (Fig. 43), the spacing between the scored lines being regulated by the adjustment of the rear scoring block in the manner described. While it is not essential, I have found it advantageous to use a small bottom roll, as at 191, in the scoring mechanism as it is possible to provide a sharper score line and therefore facilitate subsequent folding operations. The guide wire 160 supports the blank as it passes from one mechanism to another and prevents the lip from being bent under. While I have found that one wire will efficiently perform these functions, it is obvious that more than one wire may be used or any other suitable form of guiding device may be substituted.

The guides 208 are located above the blank as it emerges from the scoring rolls and act to direct its advance to the bottom forming mechanism.

The bottom forming cylinders or drums rotate continuously in opposite directions with the same peripheral speed as the scoring rolls. The advancing blank is practically simultaneously engaged by the lip and side tuck grippers on the lower cylinder and the side tuck grippers on the upper cylinder. Previous to the engagement of the lip by its gripper, the presser foot on the upper cylinder operates to iron out the lip upon the lower cylinder. The tuck grippers enter the side tuck in the blank immediately in rear of the scoring line 206 (Fig. 43) by a swinging movement. The upper layer of the blank is pressed firmly against the upper cylinder by the grippers on this cylinder and the lower layer is similarly pressed against the lower cylinder by its grippers. The continued rotation of the cylinders causes the forward or bottom end of the blank to be opened. As soon as this rotation has progressed sufficiently to completely open the end (Fig. 44), the grippers on the upper cylinder are moved by their cams to release the blank, but the grippers on the lower cylinder remain engaged. The side folders next operate to press rearwardly the upper half of the

bottom of the blank on the score line 207 and fold inwardly the side flaps. The stage is illustrated in Fig. 45, the infolding being only partially completed. These flaps are then pressed down by the ironers provided for the purpose so that the blank is now in the form shown in Fig. 46. The paste is applied to the blank by the rotary die in the manner indicated in Fig. 47, the edges of the blank being still pressed firmly against the lower cylinder by the side ironers.

The blank in this condition is next operated upon by the tucking mechanism. The jaws of the forward pinch bar are opened by the cam provided for the purpose and the forward tuck is forced therein by the corresponding blade. As soon as this blade is withdrawn, the jaws pinch the blank, causing the same to be creased transversely at this point and the front flap to be turned up, as indicated in Figs. 48 and 49. The grippers on the lower cylinder release the blank just prior to the operation of the tucking mechanism. The blank is next transversely tucked by the rear tucker in the same manner on the line 207'.

After the blank has been tucked in the manner described, it is advanced by the lower cylinder into position to be acted on by the rear flap folder. This folder presses the rear flap upon the gummed bottom of the blank as illustrated in Fig. 50. The rear pinch bar releases the blank as soon as the rear flap turner passes to allow this flap to lie flat before the front flap is turned upon it, but the forward pinch bar remains in engagement. The continued advance of the blank moves it beneath the roller forming the front flap turner. This roller presses the gummed front flap over the rear flap and completes the bag (Fig. 51). The forward pinch bar of the tucking mechanism releases the bag immediately after the operation of turning the front flap is completed. The finished bag is now disengaged from the bottom cylinder by the stripper and falls upon the conveyer which conducts it from the machine. The bag opened and ready to be filled, is illustrated in Fig. 52.

From the foregoing description it will be obvious that my improved machine is adapted to handle all weights and grades of paper and may be readily adjusted for different sizes of bag. The mechanism is capable of effective operation at high speed and all movements are rotary or of a rotary nature. The yielding mounting of the lip cutter enables the slitting mechanism to travel more rapidly than the tube without tearing the paper. The draw rolls provide a uniform feed of the paper without exerting heavy pressure thereon and also iron out the tube and prevent spreading of the same.

The combined rotary and thrust movement of the severing mechanism produces a smooth cut which greatly adds to the appearance of the bag. The bag blank is completely severed by the severing mechanism in front of the bottom forming mechanism. This is particularly advantageous as it enables the making of a large number of different sizes of bag on the same machine. The side tucks are opened prior to the passage of the blank through the severing rolls and are maintained in this condition substantially until the blank is engaged by the grippers in the bottom forming mechanism. The reciprocating bridges prevent the closing or flattening of the tucks at the scoring point and facilitate the re-entry of the stationary tuck openers. The guide extending from the severing mechanism substantially to the plane of the axes of the bottom forming cylinders supports the blank and prevents the bending down of the lip on the tube. This provides easy entrance of the lip gripper and prevents interference with the passage of the blank due to a bent lip. The cushion support of the bearings of the transfer rolls permits self-adjustment for different thicknesses of paper.

The adjustable mounting of the rear scoring bar enables the same bar to be used for all sizes of bag. The small lower scoring cylinder provides a sharp scoring of the blank and also permits the scoring mechanism to be mounted nearer the bottom forming mechanism.

In the bottom forming mechanism, one of the most important features is the automatic adjustment of the gripper for different thicknesses of paper. The spring action permits the operating member to advance after the gripper has seated. The eccentric mounting of the gripper enables it to be adjusted to compensate for wear. The cams actuating the grippers are readily adjusted for different sizes of bags. All cams operating the mechanism of the lower cylinder are located on a pair of supporting plates, one being disposed on each side of the cylinder. The cams are individually adjustable on the supporting plates. The adjustment of the cam supporting plates is manually accomplished by gauges mounted on the cylinder shaft. The lip gripper eliminates the necessity for the pins commonly used on the lower cylinder to engage the lip. A presser foot irons out the lip on the cylinder before the lip gripper moves into engagement therewith.

The paste-applying mechanism operates on the blank before the blank is tucked. A roll is provided to catch the paste thrown off by the gumming die and the roll applying the paste thereto. A scraper removes the paste caught by this roll and returns the same to the supply reservoir. An advanta-

geous device is incorporated in the mechanism to insure the uniform application of paste to the paste feeding roll. This enables the operator to quickly and easily remove or break up any lumps of paste or foreign matter which may be present in the reservoir.

The side flap folders may remain stationary or operate by a reciprocating motion. The side flap ironers extend beyond the paste-applying position and thus prevent wrinkling of the blank. The tucking mechanism is similar in construction to that used in other machines but its arrangement and coordination with the various other operations are novel and advantageous. The tucking is performed after the paste has been applied.

The back-flap turning device is adjustable to permit the timing of either of the movements of the arm for different sizes of bag. The motion of this arm insures the proper turning of the flap. The front-flap turner is eccentrically mounted to permit adjustment varying the pressure of the roll.

I am aware that the construction and arrangement of parts of my machine may be considerably changed without departing from the spirit of my invention, and I reserve the right to make all such as fairly fall within the scope of the following claims.

I claim as my invention:

1. In a machine of the class described, the combination with mechanism for advancing a paper tube, of means for forming a lip in the tube during the advance thereof including a cutter having its operating portion normally moving at a different speed than said tube and adapted to automatically conform to the speed of the tube while in engagement therewith.

2. In a machine of the class described, the combination with mechanism for advancing a paper tube, of means for cutting a lip in the tube during said advance including a rotary shaft, and a lip cutter yieldingly mounted on said shaft.

3. In a machine of the class described, the combination with mechanism for advancing a paper tube, of slitting mechanism for operating on said tube during the advance thereof, including a rotary shaft, slitting blades fixed on said shaft, and a lip cutter yieldingly mounted on said shaft to permit said cutter to conform to the speed of the tube while in engagement therewith.

4. In a machine of the class described, the combination with mechanism for continuously advancing a paper tube, of slitting mechanism operating on said tube during the advance thereof, including rotary shafts disposed above and below said tube, a pair of spaced slitting blades secured on each of said shafts, a lip cutter free on one of said shafts between the slitting blades thereon, and a spring yieldingly connecting

said cutter with its shaft to permit the operative portion of said cutter to conform to the speed of said tube during the period of engagement therewith.

5. In a machine of the class described, the combination with a supporting frame, of a tube former on said frame adapted to have a strip of paper folded thereover with the edges of the strip overlapping on one face thereof to form a seam, and a pair of rolls coacting to draw the formed tube from said former, the plane of the axes of said rolls being disposed obliquely to the plane of the tube with the roll on the seam side of the tube in advance of the other roll.

6. In a machine of the class described, the combination with a frame, of a pair of co-acting draw rolls supported therein, one of said rolls being fixedly mounted on a shaft revoluble in eccentric bearings, said bearings being revoluble in said frame to enable the spacing of the rolls to be varied by the rotation of said bearings, and means for rotating said shaft.

7. In a machine of the class described, the combination with a frame, of a pair of draw rolls supported therein, one of said rolls being fixedly mounted on a shaft revoluble in eccentric bearings, said bearings being revoluble in said frame to enable the spacing of the rolls to be varied by the rotation of said bearings, a manually operable member connecting said bearings for rotating the latter, and means for rotating said shaft.

8. In a machine of the class described, the combination with a frame, of oppositely disposed adjustable blocks mounted in said frame, bearings revolubly mounted in said blocks, a shaft eccentrically mounted in said bearings, a draw roll fixed on said shaft, a second shaft mounted in said frame, a draw roll on said second shaft co-operating with the first mentioned roll, gears connecting said shafts, means for manually rotating said bearings in said blocks to move the shaft therein toward and from the other shaft, and means for rotating one of said shafts.

9. In a machine of the class described, the combination with a frame, of a pair of co-operating scoring rolls supported therein, and a front and a rear scoring blade mounted on one of said rolls, one of said scoring blades being adjustable therein to permit the distance between said blades to be varied for different sizes of bags.

10. In a machine of the class described, the combination with a frame, of a pair of co-operating scoring rolls supported therein, and front and rear scoring blocks mounted in corresponding longitudinal slots in the periphery of one of said rolls, one of said blocks being adjustable in its slot to permit the distance between said blocks to be varied for different sizes of bags.

11. In a machine of the class described,

the combination of severing rolls, transfer rolls and scoring rolls adapted to successively operate on a blank, and a centrally disposed guide for directing the advance of a blank through said rolls.

12. In a machine of the class described, the combination with severing mechanism, scoring mechanism, and bottom forming mechanism, arranged to act successively on a blank, of means for opening the side tucks in said blank before the blank is severed and maintaining said tucks open until the blank is delivered to said bottom forming mechanism.

13. In a machine of the class described, the combination with severing mechanism, scoring mechanism and bottom forming mechanism arranged to act successively on a blank, of tuck openers disposed on opposite sides of the path of said blank and extending from in front of said severing mechanism substantially to said bottom forming mechanism.

14. In a machine of the class described, the combination with scoring rolls, of side tuck openers disposed in front and in rear of said rolls, and means acting between the front and the rear openers to maintain the forward ends of the side tucks of a blank open while the blank is passing therebetween.

15. In a machine of the class described, the combination with a pair of scoring rolls, of side tuck opening members disposed along the path of the blank in front and in rear of said rolls, and reciprocating bridges acting between the opposing ends of corresponding front and rear members to maintain the forward portions of the side tucks of the blank open while the blank is passing therebetween.

16. In a machine of the class described, the combination with a pair of scoring rolls, of tuck opening blades extending past said rolls on opposite sides of the path of the blank, said blades having a gap formed in the operative edge thereof to permit the operation of said rolls, and a reciprocating member acting in the gap in each of said blades to maintain the forward end of the corresponding side tuck of the blank open while said end is traversing said gap.

17. In a machine of the class described, the combination of a tuck opening blade having a gap formed in its operative edge intermediate the ends thereof, and a bridge acting in said gap.

18. In a machine of the class described, the combination of a tuck opening blade having a gap formed in its operative edge intermediate the ends thereof, and a reciprocating bridge acting in said gap.

19. In a machine of the class described, the combination of a tuck opening blade

having a gap formed in its operative edge intermediate the ends thereof, and a cam-actuated reciprocating bridge acting in said gap.

20. In a machine of the class described, the combination of a tuck opening blade having a gap formed in its operative edge intermediate the ends thereof, and a reciprocating bridge acting in said gap, said bridge being adapted to enter the forward end of the side tuck of the blank as said blank moves across said gap and then move forwardly with the blank to the far side of the gap.

21. In a machine of the class described, the combination of a tuck opening blade having a gap formed in its operative edge intermediate the ends thereof, and a reciprocating bridge acting in said gap, said bridge being adapted to move toward the forward end of the blank from the far side of the gap and enter the side tuck as this end advances across the gap and to then move forwardly with the blank to the far side of the gap.

22. In a machine of the class described, the combination with a pair of scoring rolls, of tuck opening blades extending past said rolls on opposite sides of the path of the blank and each having a gap formed in its operative edge opposite said rolls to permit the operation of said rolls, and a reciprocating bridge operating in each of said gaps, said bridges being adapted to move across the gap toward the advancing front end of the blank, entering the side tucks therein prior to the operation of the scoring rolls and then moving forward with the blank to the far side of the gap.

23. In a machine of the class described, the combination of a tuck opening blade having a gap formed in its operative edge intermediate its ends, a movable bridge acting within said gap, a cam for moving said bridge transversely of said gap in one direction, and a spring for moving said bridge in said gap in the opposite direction.

24. In a machine of the class described, the combination with a gripper cylinder, of a gripper, and positively actuated means for moving said gripper into yielding engagement with said cylinder.

25. In a machine of the class described, the combination with a gripper cylinder, of a pivotally mounted gripper, and positively actuated means for swinging said gripper upon its pivot into yielding engagement with the periphery of said cylinder.

26. In a machine of the class described, the combination with a gripper cylinder, of a pivotally mounted gripper, and cam-actuated means for swinging said gripper upon its pivot into yielding engagement with the periphery of said cylinder.

27. In a machine of the class described, the combination with a gripper cylinder, of grippers disposed at opposite ends of said cylinder, and positively actuated means for moving said grippers inwardly and downwardly into pressing engagement with the periphery of said cylinder.

28. In a machine of the class described, the combination with a gripper cylinder, of grippers disposed at opposite ends of said cylinder, and positively actuated means for moving said grippers inwardly and downwardly to exert a yielding pressure on the periphery of said cylinder.

29. In a machine of the class described, the combination of a revoluble shaft, a gripper cylinder on said shaft, gripper supports mounted on said shaft at opposite ends of said cylinder, grippers pivotally mounted on said supports and movable inwardly and downwardly into pressing engagement with the periphery of said cylinder, and positive means for actuating said grippers.

30. In a machine of the class described, the combination of a revoluble shaft, a gripper cylinder on said shaft, gripper supports mounted on said shaft at opposite ends of said cylinder, grippers pivotally mounted on said supports, means for moving said grippers into pressing engagement with the periphery of said cylinder and yielding elements interposed between said actuating means and said grippers to permit a limited yielding of said grippers relative to said cylinder when said grippers are in said engagement.

31. In a machine of the class described, the combination of a revoluble shaft, a gripper cylinder on said shaft, gripper supports mounted on said shaft at opposite ends of said cylinder, grippers pivotally mounted on said supports, cam-actuated means for moving said grippers into pressing engagement with the periphery of said cylinder and yielding elements interposed between said means and said grippers to permit a limited yielding of said grippers relative to said cylinder when said grippers are in said engagement.

32. In a machine of the class described, the combination with a gripper cylinder, of a gripper, means for moving said gripper into yielding engagement with said cylinder, and means for adjusting the position of said grippers for different sizes of bags.

33. In a machine of the class described, the combination with a gripper cylinder, of grippers pivotally mounted at opposite ends of said cylinder, cams for actuating said grippers, and means for adjusting said cams.

34. In a machine of the class described, the combination of a movable gripper, and means for actuating said gripper including a presser member and a yielding element in-

terposed between the operative face of said member and said gripper.

35. In a machine of the class described, the combination of a movable gripper, and means for actuating said gripper including a positively actuated presser member, and a spring plunger acting between the operative face of said member and said gripper.

36. In a machine of the class described, the combination with a gripper cylinder, of a gripper movable into operative relation therewith, and means for actuating said grippers including a presser member, a yielding element interposed between the operative face of said member and the opposing face of said gripper to cause said gripper to be moved into said relation by the forward movement of said member, and means for moving said gripper out of said engagement as soon as the pressure of said member is released.

37. In a machine of the class described, the combination with a gripper cylinder, of a gripper movable into operative relation with said cylinder, and means for actuating said gripper including a presser member, a spring plunger acting between the operative face of said member and said gripper to cause said gripper to be moved into said relation by the forward movement of said member, and a second spring plunger acting between said gripper and said cylinder to move said gripper out of said relation as soon as the pressure of said member is released.

38. In a machine of the class described, the combination with a gripper cylinder, of a gripper movable into operative relation with said cylinder, and means for actuating said gripper including a presser member, a cam for actuating said member, a spring plunger acting between said gripper and said cylinder to normally retain said gripper out of said relation, and a second spring plunger acting between said member and said gripper to cause said gripper to be moved into said relation by the forward movement of said presser member against the action of the first mentioned plunger.

39. In a machine of the class described, the combination with a gripper cylinder, of a gripper movable into engagement with said cylinder to secure a blank thereon, and a member adapted to move relative to said gripper to exert a pressure thereon to carry said gripper into said engagement by its own forward movement and to continue to move forwardly after said gripper has engaged said continued movement acting to increase the pressure on said gripper.

40. In a machine of the class described, the combination with a gripper cylinder, of a gripper co-acting therewith to engage a lip on the forward edge of a blank, and

means for pressing the lip of the blank upon said cylinder prior to the engagement of said gripper.

41. In a machine of the class described, the combination with a gripper cylinder, of a gripper coacting with the periphery of said cylinder to engage the lip of a blank, and a presser foot operating to iron the lip of the blank on said periphery prior to the engagement of said gripper.

42. In a machine of the class described, the combination with a pair of revoluble cylinders, of a lip gripper co-operating with one of said cylinders to secure the lip of a blank thereon, and a presser foot carried by the other of said cylinders and operating to press said lip upon the first mentioned cylinder prior to the engagement of said gripper with said lip.

43. In a machine of the class described, the combination with a revoluble shaft and a cylinder mounted on said shaft, of a lip gripper revoluble with said cylinder, a second revoluble shaft, and a presser foot revoluble with said second shaft and adapted to press the lip of the blank on said cylinder prior to the engagement of said gripper with said lip.

44. In a machine of the class described, the combination with a revoluble shaft, a gripper cylinder mounted on said shaft, and a lip gripper on said cylinder, of a second revoluble shaft parallel with the first mentioned shaft, a gripper cylinder on said second shaft, and a presser foot on the second gripper cylinder adapted to press the lip of a blank against the first cylinder while said lip is being engaged by the lip gripper.

45. In a machine of the class described, the combination with a pair of parallel cylinders revoluble in opposite directions, of a gripper on one of said cylinders adapted to engage the lip of a blank, and a substantially U-shaped presser foot carried by the other of said cylinders and adapted to press said lip against the periphery of the gripper cylinder as said gripper moves into engagement with said lip between the arms of said presser foot.

46. In a machine of the class described, the combination of bottom opening mechanism, side flap folding mechanism, paste-applying mechanism and tucking mechanism adapted to successively operate upon a blank in the order named.

47. In a machine of the class described, the combination with a gripper cylinder and side flap folding mechanism, paste-applying mechanism and tucking mechanism adapted to successively operate upon a blank carried by said cylinder, of side flap ironers extending substantially from said folding mechanism to said tucking mechanism and adapted to press the blank against said cylinder

during the operation of said paste-applying mechanism.

48. In a machine of the class described, the combination with a revoluble cylinder and side grippers movable therewith to secure a blank thereon, of a bottom opening mechanism, side flap folding mechanism, mechanism for applying paste to the bottom portion of the blank on said cylinder after the side flaps are folded, and means for pressing the side portions of the blank against said cylinder during the operation of said mechanisms on said blank.

49. In a machine of the class described, the combination with a revoluble gripper cylinder, of mechanism for applying paste to a blank upon said cylinder, and side flap ironers acting to press the side portions of the blank against said cylinder during the operation of said mechanism on said blank.

50. In a machine of the class described, the combination with a revoluble gripper cylinder, of mechanism for applying paste to a blank on said cylinder, and stationary metal strips extending about the periphery of said cylinder from a position in front of said mechanism to a position in rear thereof and adapted to yieldingly press the side portions of said blank against said periphery during the period of operation of said mechanism on said blank.

51. In a machine of the class described, the combination with a revoluble cylinder and means for securing a blank thereon, of means for opening the bottom of the blank, means for folding the side flaps of the opened blank, means for applying paste to the bottom portion of the blank after said flaps have been folded, and means for transversely creasing the blank after the paste has been applied thereto.

52. In a machine of the class described, the combination with a revoluble gripper cylinder adapted to hold and convey a blank, of bottom opening mechanism, side flap folding mechanism, paste-applying mechanism and tucking mechanism arranged relative to said cylinder to act successively on said blank in the order named as said blank is advanced by said cylinder.

53. In a machine of the class described, the combination with a revoluble gripper cylinder adapted to hold and convey a blank, of bottom opening mechanism, side flap folding mechanism, paste-applying mechanism, tucking mechanism, back flap folding mechanism and front flap folding mechanism arranged about said cylinder to act successively on said blank in the order named as said blank is advanced by said cylinder.

54. In a machine of the class described, the combination with means for advancing a blank, of means for folding the side flaps

of said blank as the blank is advancing including a pair of oppositely disposed folder members, and means for reciprocating said members transversely of the path of the blank.

55. In a machine of the class described, the combination with means for advancing a blank, of means for folding the side flaps of said blank as the blank is advancing including a pair of oppositely disposed folder members, cam-actuated means for moving said members inwardly over the path of the blank, and means for returning said members to their outer position upon the completion of the folding operation.

56. In a machine of the class described, the combination with means for advancing a partially formed blank, of means for folding the side flaps of said blank as the blank is advancing including folder members normally disposed on opposite sides of the path of said blank and slidable transversely of said path, and means for actuating said members.

57. In a machine of the class described, the combination with bottom opening mechanism, side flap folding mechanism, side flap ironing mechanism, paste-applying mechanism, of means for creasing the blank transversely to form the front and rear flaps after the paste has been applied to the bottom of said blank by said paste-applying mechanism, and means for successively folding said flaps after the blank has been creased.

58. In a machine of the class described, the combination with mechanism for conveying a blank, of back flap folding mechanism located adjacent to said conveying mechanism and including a back flap folding member, and means for bodily moving said member along the path of the blank in the direction of advance of said blank and simultaneously imparting to said member a kicking movement to fold the back flap.

59. In a machine of the class described, the combination with mechanism for conveying a blank, of back flap folding mechanism located adjacent to said conveying mechanism and including a folding member, means for bodily moving said member along the path of the blank in the direction of advance of said blank, and means for imparting a partial rotation to said member during said bodily movement to fold said flap.

60. In a machine of the class described, the combination with a revoluble gripper cylinder for conveying a blank upon the periphery thereof, of back flap folding mechanism located adjacent to said cylinder, and including a back flap folding arm, means for bodily moving said arm in a path substantially parallel with the path of said blank and in the direction of advance thereof, and means for imparting to said arm a swinging

movement simultaneous with said bodily movement to fold said flap.

61. In a machine of the class described, the combination with a revoluble gripper cylinder for conveying a blank upon the periphery thereof, of back flap folding mechanism located adjacent to said cylinder and including a back flap folding member, means for bodily moving said member in a path substantially parallel with the path of said blank, means for imparting a swinging movement to said member during said bodily movement, and means for adjusting each of said means.

62. In a machine of the class described, the combination with a revoluble shaft and a gripper cylinder mounted on said shaft for conveying a blank upon the periphery thereof, of back flap turning mechanism including arms revoluble on said shaft at opposite ends of said cylinder, a second shaft connecting the outer extremities of said arms and revolubly mounted in bearings therein, a back flap turning member mounted on said second shaft, means for swinging said arms to move said second shaft and said member in a path substantially parallel with the path of said blank on said cylinder, and means for rotating said second shaft during said swinging movement to cause said member to fold said flap.

63. In a machine of the class described, the combination with a revoluble shaft and a gripper cylinder mounted on said shaft for conveying a blank upon the periphery thereof, of back flap folding mechanism including arms revoluble on said shaft at opposite ends of said cylinder, a second shaft connecting the outer extremities of said arms and revolubly mounted in bearings therein, a back flap turning member mounted on said second shaft, adjustable means for swinging said arms to move said second shaft and said member in a path substantially parallel with the path of said blank on said cylinder, and adjustable means for rotating said second shaft during the swinging movement to cause said member to fold said flap.

64. In a machine of the class described, the combination with mechanism for conveying a blank, of back flap folding mechanism including a folding member, means for bodily moving said member over the advancing blank in the direction of advance thereof, and means for actuating said member to fold said flap as said member is carried past said flap by said moving means.

65. In a machine of the class described, the combination with mechanism for conveying a blank, of flap folding mechanism including a back flap folding member, means for bodily moving said member over the advancing blank in the direction of advance thereof, means for actuating said

member to fold said back flap as said member is carried past said flap by said moving means, and front flap folding means positioned relative to said conveying mechanism to fold the front flap as the blank is moved past the same by said conveying mechanism.

66. In a machine of the class described, the combination with scoring rolls and draw rolls, of severing rolls interposed between said scoring rolls and said draw rolls to completely sever the successive blanks before they are presented to said scoring rolls.

67. In a machine of the class described, the combination with draw rolls, severing rolls and scoring rolls arranged to operate successively on a formed paper tube, of co-operating transfer rolls interposed between said severing rolls and said scoring rolls and adapted to permit a limited slippage of each successive blank as such blank is being severed from the tube by said severing rolls.

68. In a machine of the class described, the combination with a revoluble shaft and a gripper cylinder mounted on said shaft, of a gripper revoluble with said cylinder and co-acting therewith, a cam support, a cam on said support, and means for adjusting said support to position said cam for different sizes of bag.

69. In a machine of the class described, the combination with a revoluble shaft and a gripper cylinder mounted on said shaft, of a gripper revoluble with said cylinder and co-acting therewith, a cam support, a cam on said support, and a manually operable gauge for adjusting said support to position said cam for different sizes of bag.

70. In a machine of the class described, the combination with a shaft and a gripper cylinder mounted on said shaft, of grippers and pinch bars revoluble with said cylinder, a stationary cam support, cams on said support for actuating said grippers and said pinch bars, and means for moving said support to simultaneously adjust said cams for different sizes of bag.

71. In a machine of the class described, the combination with a shaft and a gripper cylinder mounted on said shaft, of grippers and pinch bars revoluble with said cylinder, a stationary cam support, cams on said support for actuating said grippers and said pinch bars, and a manually operable gauge for moving said support to simultaneously adjust said cams for different sizes of bag.

72. In a machine of the class described, the combination with a shaft and a revoluble gripper cylinder mounted on said shaft, of grippers disposed at opposite ends of said cylinder and revoluble therewith, a stationary cam support disposed near each of said ends, cams on said supports for actuating the corresponding grippers, and means for adjusting each of said supports to position the cams thereon for different sizes of bag.

73. In a machine of the class described, the combination with a revoluble gripper cylinder, of a gripper support, grippers on said support co-acting with said cylinder, means for adjusting the grippers on said support, and means for adjusting said support to position the grippers for different sizes of bag.

HERMAN G. WEBER.